

POWER TRANSMISSION DESIGN

FEBRUARY 1961

INCLUDING BEARINGS DESIGN / APPLICATION

Can power transmission
component marking
be improved?

A PTD SPECIAL REPORT

Calculating bearing loads
with worm gears

Better bandsaw built
with hydraulic drive

ALSO IN THIS ISSUE:

- Electric Clutches Select Constant Speeds • High-Torque Motors Eliminate Flywheel

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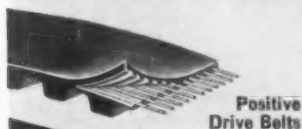
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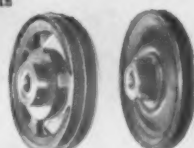
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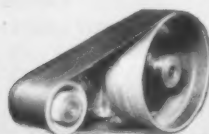
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POWER TRANSMISSION DESIGN

THE MAGAZINE OF MACHINE DRIVES



FEBRUARY 1961

volume 3 number 2

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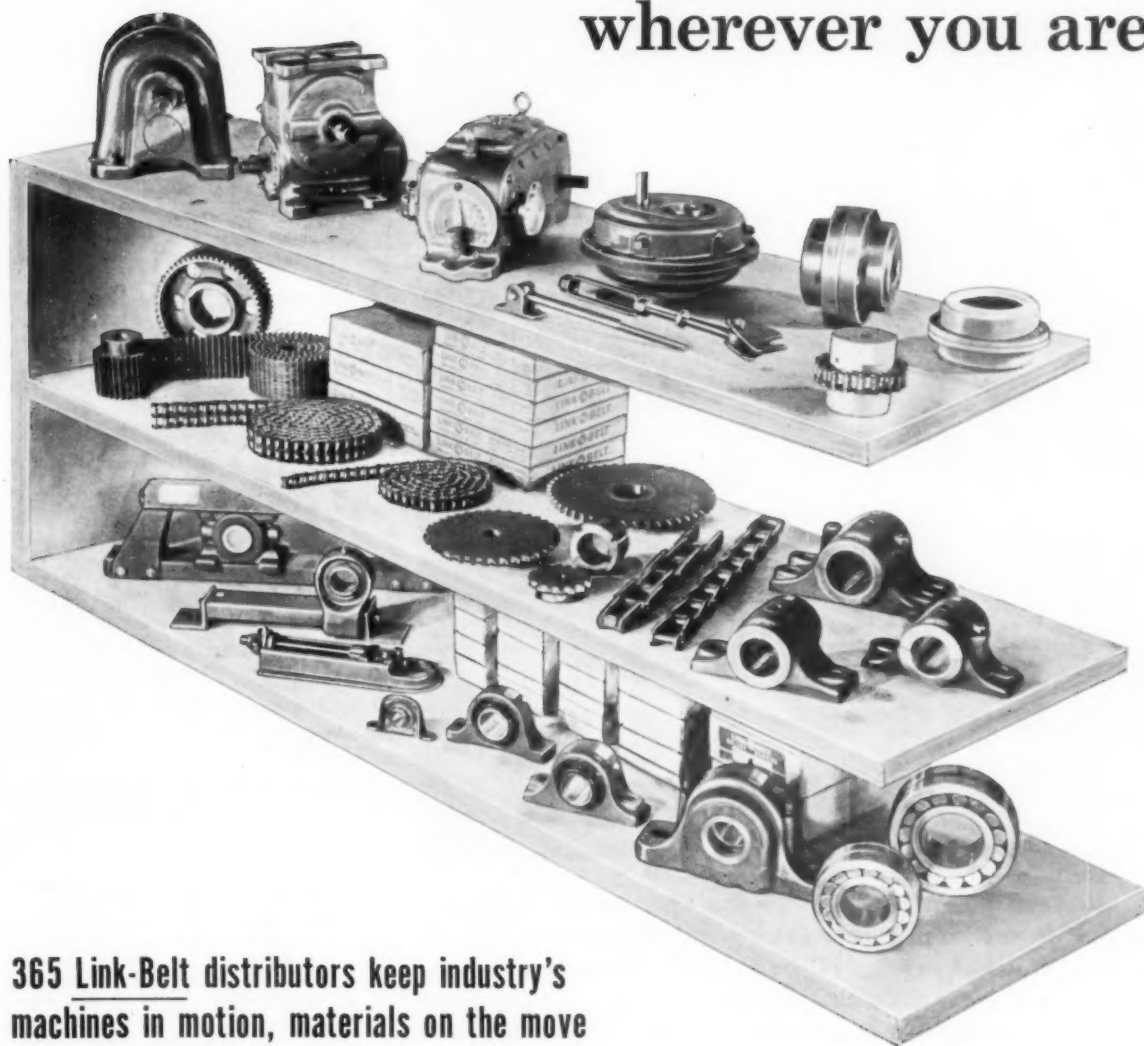
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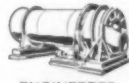
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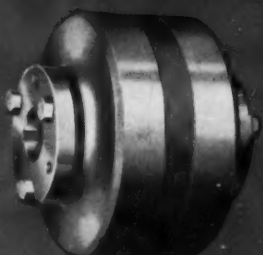
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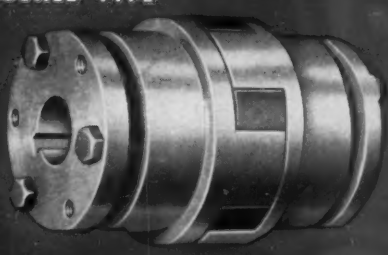
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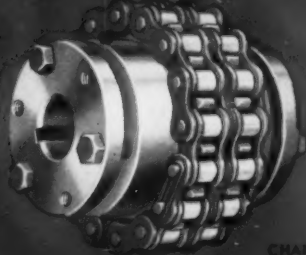
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JAW TYPE



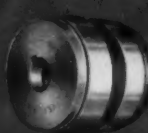
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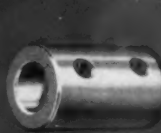
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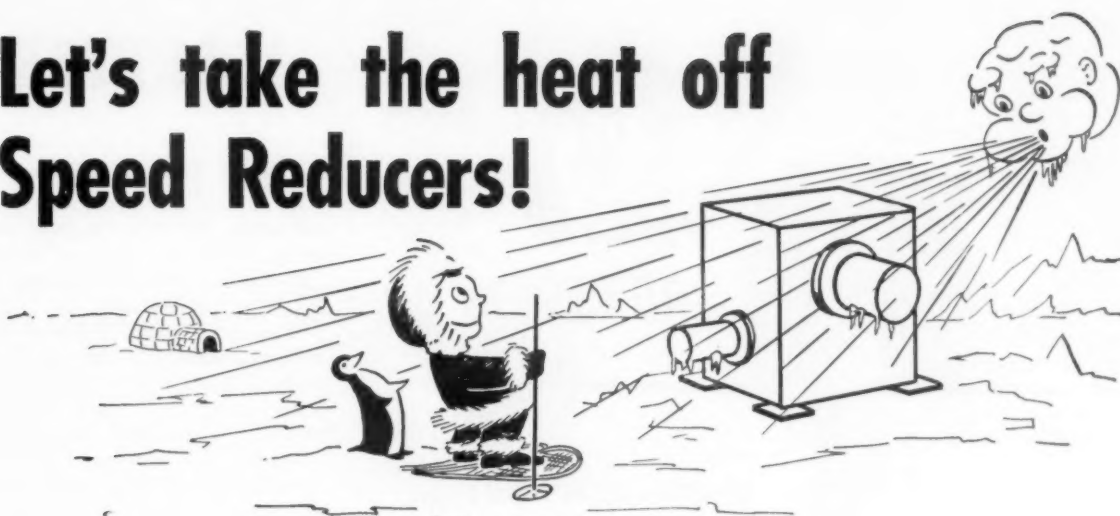
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POWER TRANSMISSION DESIGN

Let's take the heat off Speed Reducers!



A worm gear speed reducer is one of the toughest little customers in captivity. It reduces speeds day-in, day-out, with little complaint. While it works long and hard, it has limitations—set by ratio, center distance, RPM, mechanical and thermal HP ratings, etc. And, depending upon how precisely it was selected and fitted to the job requirements, it will do what it has to do.

But sometimes it's forced to play outside of its league. It must cope with job requirements that vary from here to there—normal 8 to 10 hour service without recurrent shock, the same length of service where there is some shock loading, continuous low-speed service and almost countless others. But the thing that really puts the pressure on reducers, the thing that's lurking in *every* set of job requirements—is h-e-a-t.

When you exceed the thermal capacity of a reducer for more than an hour or so, excessive temperature thins the lubricant resulting in wear; material, bearing and oil seal failures; etc. Of course, the proper lubricant will help but it can't cure the continuing problem of excessive heat.

So how can we lick this toughy? One way is to build the reducer housing oversize, big enough to radiate the heat away and keep temperatures down. But this type sticks out in aisles, louses up compact designs and barks shins. Then, we might try a smaller housing complete with fins on it to dissipate the heat. If this still doesn't work, another trick is to use a reducer with capacities and ratings a step above the ones we need. This is sending a man to do a boy's job. It's impractical, inefficient

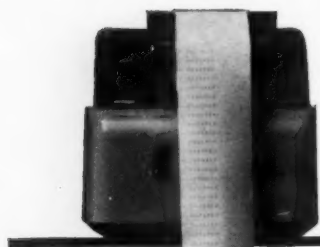
and costly. There *has* to be an easier, better, saner and cheaper way to do it. And there is!

In certain cases, where the size and type of reducer permits and where we can gain enough in thermal HP rating to keep heat generation in bounds, Cone-Drive Gears does it with fan-cooling.

What's that? Simple. Just add a fan to the worm shaft plus the necessary air shields, fan cover, etc., and presto!—heat is no longer a problem. The air shields direct the fan-pushed air over the fins on the lower portion of the reducer. The fins are shaped and spotted to guide the air stream where it is needed. Thermal HP ratings are boosted tremendously, as high as 147% above those of standard reducers in some cases! Those over-worked, over-heated reducers will now do the job you bought them to do.

Other advantages? They're here in abundance. The size of the reducer stays the same. All parts on a Cone-Drive fan-cooled reducer are 100% interchangeable with parts for standard reducers. Oil capacity is identical. Shields are quickly removed without disconnecting the reducer. (This is important where severe operating conditions make periodic cleaning necessary). The reducer can also be operated *without* fan-cooling just by taking off the fan and shields.

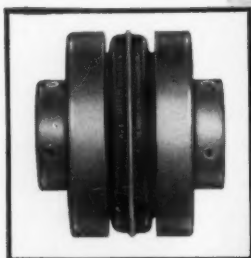
This simple addition to standard Cone-Drive HU speed reducers might be just your answer—might save you some money. Write for Cone-Drive's Bulletin CD-218. It will tell you all about the full line of Cone-Drive double-enveloping worm gear reducers as well as the fan-cooled kind. Cone-Drive Gears, Div. Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.



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LETTERS

AC Motor Selection—Part I

We enjoyed this article very much and believe that it is something very much needed in a perhaps slightly less technical form by mill and industrial supply salesmen.

On page 22 under "Applications," we believe there is a mistake in the statement that the hp requirement of fans and centrifugal pumps varies as the square of the speed. The affinity laws state that for fans and centrifugal pumps, the hp requirement varies as the cube of the speed.

This perhaps has already come to your attention, however, we thought you would like to correct this error.

THE CAMERON & BARKLEY CO.
Machine Tool Division
Albert J. Jackson, Engineer

You're right! We'll make certain that this figure is correct in the forthcoming reprint of the three articles on electric motors.

Reprint request

Every month we receive your magazine and eventually it reaches my desk. This particular issue reached my desk without your feature article, "AC Motor Selection—Part I."

Would you please notify me on the procedure for acquiring a reprint of this article?

If there is more than one part to the article, I would appreciate receiving copies of these also.

CONE DRIVE GEARS
Div. Michigan Tool Co.
J. R. Ahlberg
Manager, Gearmotor Section

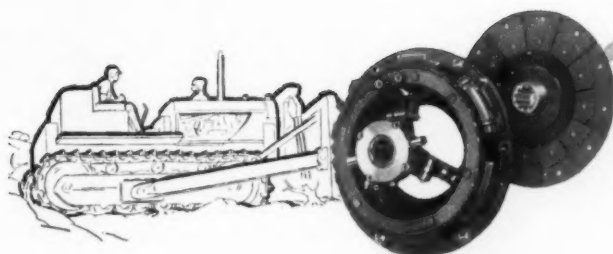
As we so casually mentioned above, we are reprinting Parts I and II of "AC Motor Selection" along with another article on DC motors which appeared in our January 1961 issue. They are available as a complete reprint.

Prices: \$1 each for 1 through 9 copies; 75c each for 10 through 49; and 50c each for 50 or more copies.

Thanks for your interest.

POWER TRANSMISSION DESIGN

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Torture testing pits burst clutches to bits! At specified intervals, clutches are removed from the production line to undergo severe centrifugal tests. These clutches are spun to destruction but must withstand predetermined high speeds and specified time limits.

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Corrosion resistant discs are made of high carbon spring steel. Heat treated cast iron improves grain structure of pressure plates. Strong construction is Rockford's key to long and rugged service.

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Smooth engaging Rockford Clutches are vibration-free! Rockford Clutch eliminates vibration through dynamic and static balancing. Clutch vibration can ruin bearings and crack housings. Minimum inertias prevent gear clashing and delayed shifting.

PRECISE PRODUCTION MEANS PRECISE PERFORMANCE

Each Rockford Clutch component is precision built. Rotary surface grinding assures uniform thickness. Discs are checked carefully for dish and run-out. Inspectors check close tolerances for flatness by pressure and weight-drop drag machines.

If you need clutches for original equipment or for replacement, Rockford Clutch offers the highest quality in power control. From research to inspection, Rockford Clutches are designed and built for long, rugged and reliable service. Rockford offers an ultra-wide range of power controls for all industries. Write today for illustrated brochure.

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DIVISION
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NEWS

from the power transmission field

Ninety-six V-belts drive Norwegian icebreaker



Breaking through ice, as unwary skaters know, can give a nasty shock to the system. This applies just as much to the drive system of the nautical type of icebreaker. Chunks of ice striking the screw could destroy a conventional geared reduction

drive. So the designers of the "Herkules" used V-belts instead—ninety six of them in what is claimed as the world's largest V-belt drive system.

The "Herkules," which doubles as an ocean tug and salvage vessel, carries four 1100 hp diesel engines,

each of which drives a set of 24 precisely matched belts. Power is transmitted to the central shaft which turns the variable pitch propellor. The belts used are the Goodyear HY-T multiple-ply endless type, 420 inches each belt.

When the ship is running light and full power is not needed, a single engine or any combination of engines can be used to drive the prop. This is done by disconnecting the forward pair of engines from the rear ones by a central clutch. Individual clutches on each engine can then be disengaged to set the belt system free to be driven by just one engine. Trial runs showed that the clutch arrangement permits a single engine to use the inertial mass of the 86 in. belt sheaves on the main shaft as a flywheel.

Goodyear engineers, who helped with the design and installation of the unit, established a 3:1 reduction from motor speed to the prop shaft's 200 rpm at full power. Belts are strung on 28 in. sheaves at each motor and tensioned over adjustable take-up rollers. Changing belts is easy—the tension rollers are relaxed and the main shaft disconnected, providing room for the belts to be slipped into place. Weight and space saving (remember the spares that would be needed for a geared drive) have increased the ship's planned fuel capacity by 150 tons.

The "Herkules" was commissioned by A/S Norsk Bjergningskompagni of Bergen, and the drive system was designed by engineers of A/S Mjellem & Karlsen, a Bergen ship-building firm.

ASTM publishes standards on lubricants

The American Society for Testing Materials has brought out Volume 1 of its Compilation of Standards on Petroleum Products and Lubricants. This covers most of the ASTM standards on petroleum, including crude petroleum, butadiene, motor and aviation fuels, naphthas, diesel fuels, lubricating oils, industrial oils, cutting oils, turbine oils, greases, waxes, spray oils, and other related materials.

This is the 37th annual compilation, which includes methods of testing, specifications, definitions, charts



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Cincinnati 27, Ohio

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Payloader H-70—photo courtesy The Frank G. Hough Co.

R/M sintered friction development use-proven in over 6000 Payloaders

The Hough-built "PAYLOMATIC" P-600 full power-shift transmission utilizes a wet-friction application jointly developed by The Frank G. Hough Co., Libertyville, Ill., and Raybestos-Manhattan.

No friction failures

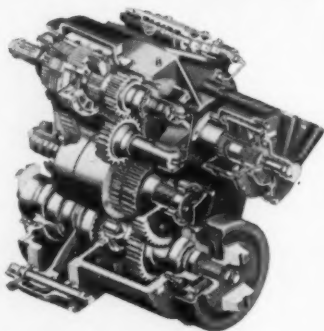
Project engineer Harry Wilson says: "We have over 6000 units in the field. There hasn't been a friction failure in the lot. The design we developed with R/M's co-operation has been use-proven. We're well satisfied with R/M's ability to help design and then deliver a superior friction material at a competitive price."

Several types of materials were tested in R/M laboratories and then on Payloader tractor shovels. Sintered bronze was the material chosen for the friction plates. Plate speeds range from 1370 to 6140 rpm; gross plate pressure to 180 psi.

Unbiased recommendations

Wherever you are, one of R/M's 25 sales engineers can be at your desk within 24 hours to help you tackle any friction material problem. *Only R/M manufactures all types of friction materials—your assurance of unbiased recommendations!*

Send for your free copy of R/M's Bulletin No. 501. It is packed with helpful engineering information. Write today.



"PAYLOMATIC" full power-shift transmission; 3-speed, fully reversing, constant mesh, countershaft type with balanced, rotating, hydraulic clutches continuously pressure-filled, cooled and lubricated.

This sintered friction plate, OD 5 3/4 in., is used in an oil-immersed application in "PAYLOMATIC" transmissions. The number of plates and the ratios vary between the models to meet torque requirements.



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NEWS

and tables. The Society expects to publish Volume II early in 1961.

Copies of Volume I, which is a hard cover book of 1130 pages, can be obtained from ASTM headquarters, 1916 Race St., Philadelphia 3, Pa., at \$9.50 each.

MPB and French ball bearing firm team up

Miniature Precision Bearings, Inc., Keene, N. H., has completed an agreement with Societe Nouvelle de Fabrications Aeronautiques (SNFA), manufacturer of large precision ball bearings, to broaden the line which each company offers its market. Each will become exclusive representative of the other in their respective countries.

Both companies are well known. MPB offer more than 500 different types and sizes of bearings for instrument applications, while SNFA bearings are widely used both in the U. S. and Europe for aircraft jet engines and machine tools. They are produced to ABEC 5, 7 and 9 tolerances, with customer designed engineering that include the use of rollers as well as balls, or combination types.

The agreement, already in effect in both countries, is the culmination of a two-year period of preparation, involving exchange visits by technicians and training for sales and service personnel.

Industry will predominate in ASM Exposition

The American Society for Metals Western Metal Exposition, March 20-24 in Los Angeles, will be mainly concerned with industry, according to Allen Ray Putnam, ASM managing director. Both exposition and technical sessions of the 12th Western Metal Congress (to be held at the same time) "will benefit every industrial concern identified in any way with metals or metal fabrication in the 11 western states."

"Each will be of educational nature, revealing the newest in research findings to impart better functional qualities to aircraft, missiles, rockets,

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- Flexible synthetic rubber seal is bonded to steel core for strength
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- Seal drag is controlled to give low torque with less power required
- Produce economy by eliminating maintenance time
- Reliability provided by elimination of down time
- Operating range from — 80° F. to + 225° F.
- Manufactured to standard AFBMA dimensions and tolerances
- MRC Synthe-Seal[®] bearings are backed by 62 years experience in manufacturing ball bearings

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listing sizes available

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NEWS

space ships and the metal products of industry."

Termed "Idea Center for Industry—West," the two presentations will be attended by all of ASM's officers and trustees, headed by president William A. Pennington, professor of metallurgy at the University of Maryland.

Dalton Gear consolidates facilities

Dalton Gear Co., of Minneapolis has concentrated its manufacturing facilities in a new 35,000 sq ft building which includes hardening and flame cutting departments and an air-conditioned inspection department.

The new building is laid out for a steady flow of raw material to finished product. This, along with the consolidation, is expected to greatly increase efficiency.

Saginaw Div. forms actuator operation

In a major organizational revision, the Saginaw Steering Gear Div., General Motors Corp., has established a separate actuator operation for the research, development, design, pro-

duction and application of ball bearing screws and splines made by the division.

Edward B. Kobylzak has been appointed manager of actuator activities and will report directly to W. H. Doerfner, general manager of Saginaw Steering Gear Div. The five major subdivisions of the actuator operation—design, production, production control, applications and tool engineering—will be headed by: David A. Galonska, staff engineer; N. M. Ranke, general superintendent; L. J. Gunther, supervisor of production control; P. V. Wysong, Jr., chief applications engineer; and C. L. Sandlin, senior tool engineer.

CBBI commissions research on hydrostatic lubrication

Franklin Institute Laboratories for Research and Development, Philadelphia, has been awarded a contract to explore hydrostatic lubrication in its relation to cast sleeve bearings.

Carter N. Paden, Jr., President of the Cast Bronze Bearing Institute (a product group of the Non-Ferrous Founders Society) explained that in low-speed, high-load applications, hydrodynamic lubrication may be impossible. If full-fluid-film lubrication is required, hydrostatic lubrication then has great advantages.

Information obtained from the



NOTHING LIKE IT! The industry's only complete volume of products, producers and sources—the **POWER TRANSMISSION DESIGN HANDBOOK AND DIRECTORY**—is off the press. J. C. Salette, Jr., Directory general manager (left), shows the first edition to Lee Witzburg, vice president, Cleveland Worm & Gear Div., Eaton Mfg. Co. The Directory was compiled by the editors of Power Transmission Design.

ASARCON

DISTRIBUTORS FOR ASARCON CONTINUOUS-CAST BRONZE:

ALABAMA
Birmingham
Dixie Bronze Co., Inc.
FA-4-4588
J. M. Tull Metal & Supply Co., Inc.
FAIRFAX 3-1612

ARKANSAS
Little Rock
Arkansas Foundry Company
FRANKLIN 2-6261

CALIFORNIA
Los Angeles
Kingwell Bros., Ltd.
LUDLOW 2-7427
San Francisco
Kingwell Bros., Ltd.
SUTTER 1-0514

CONNECTICUT
Guilford
Knappe Foundry Co., Inc.
GLENDALE 3-2744
Seymour
The Derby Castings Co.
TUXEDO 8-2581
Stratford
The Elsworth Industrial Supply Co.
EDISON 7-3317

FLORIDA
Jacksonville
J. M. Tull Metal & Supply Co., Inc.
EVERGREEN 7-5561
Miami
J. M. Tull Metal & Supply Co., Inc.
OX 6-0150
Tampa
J. M. Tull Metal & Supply Co., Inc.
CLEVELAND 3-6141

GEORGIA
Atlanta
J. M. Tull Metal & Supply Co., Inc.
JACKSON 5-3871

ILLINOIS
Chicago
Bearing Headquarters Co.
Div. Ray M. Ring Co., Inc.
ESTEBROOK 9-0300
Bronze Bearings, Inc.
JUNIPER 3-1100
Peoria
Ray M. Ring Bearing Co.
PEORIA 6-73-8171
Rockford
Rockford Tool & Transmission Co.
ROCKFORD 2-7711
Waukegan
Bearing Headquarters Co.
Div. Ray M. Ring Co., Inc.
NA 3-5212

INDIANA
East Chicago
Bearing Headquarters Co.
Div. Ray M. Ring Co., Inc.
E. CHICAGO EX 7-8020
SAGINAW 1-8660
Indianapolis
Jones & Laughlin Warehouse Div.
Jones & Laughlin Steel Corp.
MELROSE 1-8311
South Bend
Powell Tool Supply, Inc.
ATLANTIC 9-5578

KENTUCKY
Louisville
Williams & Co., Inc.
JUNIPER 3-7781

LOUISIANA
New Orleans
Standard Brass & Mfg. Co.
AUDUBON 1381
Shreveport
Standard Brass & Mfg. Co.
UN 4-4241

MARYLAND
Baltimore
Bronze Specialties, Inc.
LEXINGTON 9-1906

MASSACHUSETTS
Boston
Kelco Metal Products Co.
HUBBARD 2-1737
Millard Brass & Copper Co.
HIGHLANDS 2-6220

MICHIGAN
Detroit
Copper & Brass Sales, Inc.
FOREST 5-6200
Meier Brass & Aluminum Co.
JORDAN 6-3907
Grand Rapids
Copper & Brass Sales, Inc.
EMPIRE 1-6681
Kalamazoo
Bard Tool and Equipment Co.
FRIESIDE 3-2691
Lansing
Superior Brass & Aluminum Co.
IV 2-7754
Muskegon
Towne Hardware & Supply Co.
7-2651

MINNESOTA
Minneapolis
R. G. Erde, Inc.
FE 8-4846

MISSOURI
Kansas City
Associated Bearings Co.
HARRISON 1-9407
St. Louis
R. J. Bearing Co.
MISSION 7-3605

NEBRASKA
Grand Island
The Island Supply Co.
DUPONT 2-8567
Omaha
T. S. McShane Co., Inc.
JACKSON 1273

NEW JERSEY
Carlestadt
E. A. Williams & Son
GENEVA 8-0830
MARKET 3-1929
(New York LA 4-9546)

Newark
Federal Bronze Products, Inc.
MARKET 2-6330

Perth Amboy
Gregg's Brass Foundry
HILLCREST 2-2086

NEW YORK
Brooklyn
Hambley, Inc.
STUYVESANT 8-1144
Buffalo
Kencroft Associates, Inc.
RIVERSIDE 1520
Rochester
Ontario Metal Supply, Inc.
HAMILTON 6-1630
Syracuse
Wilson Bronze Foundry, Inc.
GLENVIEW 4-3231
Troy
The Troy Belting & Supply Co., Inc.
AS 2-4920 (in Albany 3-6121)

OHIO
Akron
Akron Welding and Spring Co.
JEFFERSON 5-2187
Cleveland
Copper & Brass Sales, Inc.
VU 3-8100
The Bearing Bronze Co.
MICHIGAN 1-6520
Cincinnati
Reliable Castings Corp.
KIRBY 1-2627
Columbus
Williams & Co., Inc.
AXMINSTER 4-1623
Dayton
The Bristol Brass Corp. of Ohio
BALDWIN 8-8185
Toledo
The Seagar Brass Company
KIRBY 5-5371
Williams & Co., Inc.
GREENWOOD 5-8661

PENNSYLVANIA
Easton
R. T. Schaller Co.
BL 2-7435
Latrobe
Latrobe Foundry Machine
& Supply Co.
KEYSTONE 7-3341
Philadelphia
Brass & Copper Sales, Inc.
GLADSTONE 7-2500
Renewal Service, Inc.
BALDWIN 9-6330

Pittsburgh
Pennsylvania Industrial
Supplies Co., Inc.
ALLEGHENY 1-5010
Pittsburgh Brass Mfg. Co.
ATLANTIC 1-8761

RHODE ISLAND
Providence
Clifford Metal Sales Co., Inc.
UNION 1-4100

SOUTH CAROLINA
Greenville
J. M. Tull Metal & Supply Co., Inc.
CEDAR 3-8364

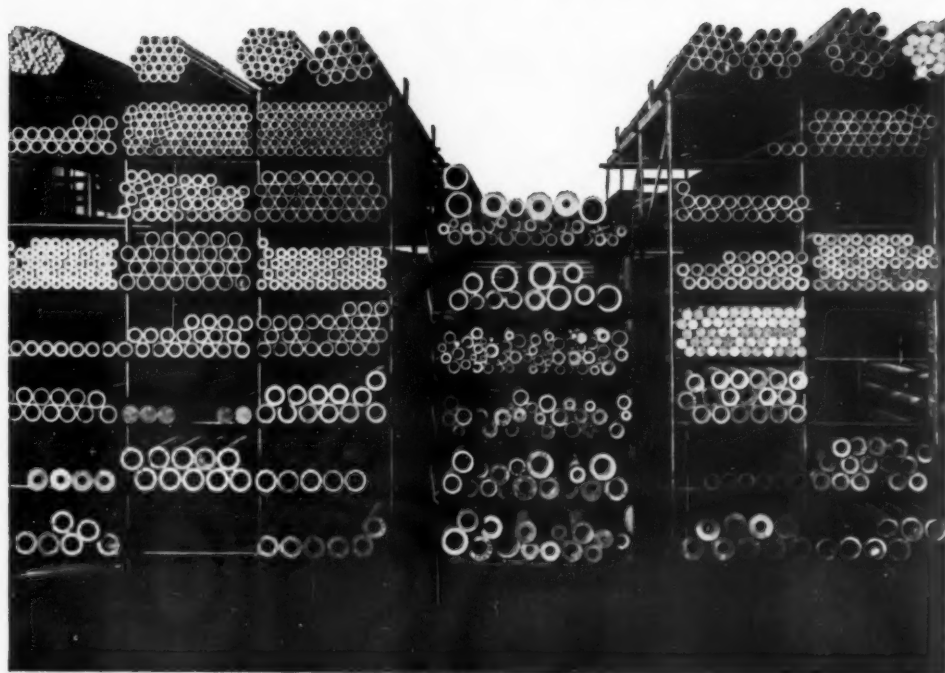
TENNESSEE
Memphis
Memphis Bearing & Supply Co.
JACKSON 6-7543
Nashville
Dixie Bearings, Inc.
CHAPEL 2-7351

TEXAS
Beaumont
Standard Brass & Mfg. Co.
TERMINAL 3-2641
Houston
Standard Brass & Mfg. Co.
H 7-1270
Port Arthur
Standard Brass & Mfg. Co.
YUKON 5-9377

WISCONSIN
Milwaukee
Badger Bearing Co.
BROADWAY 2-0231

CANADA
Lachine, Quebec
Federated Metals Canada, Ltd.
MELROSE 7-3591
Scarborough, Ontario
Federated Metals Canada, Ltd.
PLYMOUTH 7-3246

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POWER TRANSMISSION DESIGN



ASARCON 773

ORDER ASARCON CONTINUOUS-CAST BEARING BRONZE IN ANY LENGTH

**ELIMINATE
SHORT-END SCRAP,
SAVE TIME,
METAL AND MONEY**

When you order Asarcon 773 (SAE 660) continuous-cast bearing bronze, you receive the exact length you specify. You choose from more than 260 stock sizes — solids and tubes — and have your order cut in any length you want up to 105". You never have to include the cost of short end scrap in the price of your finished part, because Asarcon 773 eliminates the remnant problem.

By providing diameters close to your finished sizes, Asarcon further reduces the cost of scrap. With only 1/32" to 3/32" to machine off, there is more usable metal, machining time is reduced, work moves faster. Because it is produced by the unique continuous-cast process, Asarcon 773 has unusually high density. Every casting has more resistance to metal fatigue, superior hardness, higher tensile, yield and impact strength . . . and each is guaranteed free of blow holes, shrinks, voids, pits.

For further information, call or write your nearby distributor (see listing on opposite page), or write Continuous-Cast Department, American Smelting and Refining Company, Perth Amboy, New Jersey.



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... another NEW product from

Stearns

... pace-setting pioneer in electro-magnetic clutches—brakes—clutch-brakes

**NOW AVAILABLE—
540 lb-in. Torque
Miniature Clutch
Model 5.5
Style SMR*
(Shown 1/2 Size)**



*Style SMR
signifies
Stationary
Magnet Body,
Rotor—Ball
bearing mounted.

**MORE TORQUE PER POUND . . .
MORE TORQUE PER CUBIC INCH . . .
weighs 24%—63% LESS, occupies 19%—64% LESS cubic area,
than other standard clutches of similar torque rating!**

MODEL	MAX. TORQUE	DIAMETER	DEPTH	Max. V.D.C.W.	Max. Watts	Weight
6.5	540 lb-in.	5 1/4"	2 1/2"	115	26	12 lb.
5	240 lb-in.	4 3/4"	1 3/4"	90	12	5 1/2 lb.
3.5	100 lb-in.	3 1/4"	1 1/2"	90	11	3 1/2 lb.
3.2	80 lb-in.	2 3/4"	1 1/2"	90	9.6	3 lb.
3	60 lb-in.	2 3/8"	1 1/2"	90	5.7	2 1/2 lb.
2.5	30 lb-in.	2 1/4"	1 1/2"	90	5.3	1 1/2 lb.
2.2	8 lb-in.	1 3/4"	1 1/2"	90	4.6	20 oz.
1.8	2 lb-in.	1 3/8"	2 3/4"	90	4.2	2 1/4 oz.

- For applications requiring high torque, high running speed, minimum size and weight.
- Ball bearing mounted rotor, and stationary magnet body eliminate alignment problems—speed installations.
- Can be supplied: 1. For 6, 12, 28, 90, 115 VDCW—class "A" through class "H" insulation. 2. With integral sprockets or sheaves. 3. To meet military specifications. 4. In split and thru-shaft arrangements. 5. In any combination of the above. 6. As magnetically set brakes, and as clutch-brake combinations.

- *Installation-Proved*—for Assured Matched-to-the-Machine Performance and Long Life. Request complete Clutch Data File 61C.

Stearns

ELECTRIC CORPORATION

120 NORTH BROADWAY • MILWAUKEE 2, WISCONSIN

The Complete Line of Electromagnetic Clutches—Brakes—Clutch-Brakes

SINCE 1917—THE CHOICE OF LEADING MOTOR AND MACHINERY MANUFACTURERS

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NEWS

program will eventually be used to expand the hydrostatic lubrication section of the Cast Bronze Bearing Design Manual, which was originally prepared by the Franklin Institute under the auspices of CBBI.

Research will cover principles, load carrying capacity, flow pressure and power requirements, and include a sample problem of analysis and design.

As this new information becomes available, it will be released as a separate publication.

Motor builder adds "white room"

A sort of operating theatre for electric motors has been opened at Dayton, Ohio, by Globe Industries, Inc. Known as a "white room," it's designed for the assembly of critical electric motors and other devices.



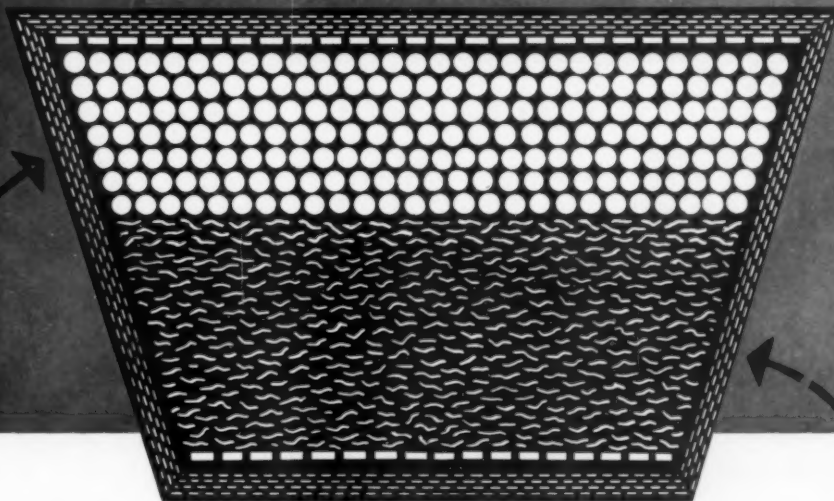
"White rooms" have been operated for a number of years by makers of gyroscopes and similar precision equipment, but Globe believes that this is the first to be used by an electric motor manufacturer.

Access to the sealed room is through an air lock. Inside, the temperature, humidity and air purity are held constant around the clock. Temperature is 76 F; RH is 40 to 50%; all incoming air passes through an electric precipitator, as well as the air conditioner and dehumidifier. Workers wear lintless smocks, hair coverings and special moccasins to guard against bringing in dust and dirt.

Warner Electric forms Japanese subsidiary

Warner Electric Brake and Clutch Co.'s president, Steven P. J. Wood, has announced the establishment of

Only BOSTRON V-Belts



are made with...

BOSTRON Tensile Members

PLUS

NEOPRENE with FIBER-DISPERSED Stock

GREATER STABILITY — Changes in humidity — and the resulting moisture regain — often mean a matching problem with ordinary V-Belts. The moisture regain of BOSTRON is low — 0.4% — or $\frac{1}{20}$ th that of the conventional reinforcing fiber. This means far less time spent in matching, and lower belt inventory too.

HIGHER STRENGTH — Stronger belts can withstand more shock loading, need less maintenance. BOSTRON is approximately 40% stronger than the conventional fiber used in V-Belts.

STRETCH RESISTANCE — V-Belts reinforced with BOSTRON have low stretch. BOSTRON is inherently stretch-resistant and the cords are put through a special heat and tensioning process to further minimize stretch. Thus, belts reinforced with BOSTRON show comparatively little growth — even after many months of continued operation.

GREATER RESISTANCE to oils, heat, abrasion, chemicals and ozone is provided by Neoprene.

HIGH CROSS-WISE RIGIDITY is provided by the closely-packed, straight-line formation of the fibers in the compression member.

EXCEPTIONAL LENGTH-WISE FLEXIBILITY is provided by the virtually frictionless positioning of fibers.

EXTRA SUPPORT for the tensile members during shock-load impact and during normal operation.

The industry's most advanced developments are now standard in the entire BOSTON Multiple V-Belt line!

● CUT DOWN MAINTENANCE ● MAINTAIN SMALLER INVENTORY ● SAVE MATCHING TIME ● SAVE TAKE-UP TIME

BOSTON

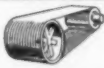
BOSTON WOVEN HOSE & RUBBER COMPANY
DIV. OF AMERICAN BILTRITE RUBBER CO., INC.
BOSTON 3, MASS.



INDUSTRIAL HOSE



BELTING



V-BELTS



PACKING



MATTING



TAPE

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Fast Delivery

Quality



SIMONDS

INDUSTRIAL

CUT GEARS

- ★ FINISHED GEARS
- ★ CUSTOM GEAR CUTTING
- ★ HEAT-TREATED, CASE OR FLAME-HARDENED

You are sure of quality and prompt service when you place your industrial cut gear requirements with SIMONDS GEAR. We produce the full range of sizes in the types and materials you need from your blanks or ours. Let us quote on your next gear requirements.

* * *

Stock carrying distributors of Ramsey Silent Chain Drives and Couplings; and industrial V-belts.

SPUR GEARS
BEVEL GEARS
MITRE GEARS
WORMS • WORM GEARS
RACKS • PINIONS
Cast or forged steel,
gray iron, bronze,
Meehanite, rawhide
or bakelite



THE SIMONDS

GEAR & MFG. CO.

LIBERTY at 25TH PITTSBURGH 22, PA.

Quality Gears for over 65 Years

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16

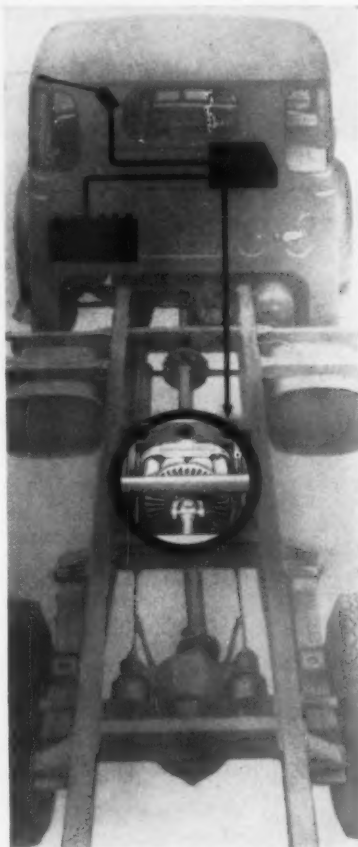
NEWS

a Japanese subsidiary, Warner (Japan) Ltd., of Tokyo.

The Japanese subsidiary is 85% owned by Warner and 15% by Shinko Electric Co., Ltd. Under the agreement, the subsidiary will license Shinko Electric to make and sell Warner Electric brakes and clutches throughout the Far East.

The main foreign market for these products is in the automation of industrial equipment, a field in which Japan is the leader in Asia.

Lear granted U.S. rights to French braking device



Exclusive sales rights and option to manufacture an electrical braking device for trucks, trailers and buses has been granted to Lear, Inc. by the French manufacturer, Telma, of Paris.

Named the retarder, it has been used successfully in France for more than ten years and is compulsory

for coaches and buses in mountainous regions. Inserted in the drive shaft, permanently geared to the rear wheels, the retarder requires only the battery for excitation. The vehicle's own energy is used to retard its motion. No water, oil or other auxiliary medium or energy source is needed.

The retarder works completely independently of the brakes and can be used even with the clutch out. Official tests in France showed that it will consistently stabilize a 14 ton truck's speed at 22 mph on a 9% downgrade. The retarder alone will decelerate a truck from 47 to 6 mph in less than 220 yards. It's claimed that neither mechanical failure nor careless handling can cause failure of the retarder. Savings up to 70% in brake linings and tire replacements have been reported by users. Standard models cover vehicles with maximum loads of up to 35 tons.

Recent Writings from Russia

Soviet articles and books reveal a number of advanced techniques that could benefit U. S. industry. Translations, published by the U. S. Government, are available from the Office of Technical Services. Here are reviews of some recent publications:

GEARS:

The Scientific Research Institute of Automotive Engineering and the Gorky Automobile plant have developed a honing process for hardened gears. Abrasive stones twice the size of those on conventional hones, and increased honing pressures are used. The process, which takes the place of internal grinding, increases productivity, improves surface finish, and cuts cost.

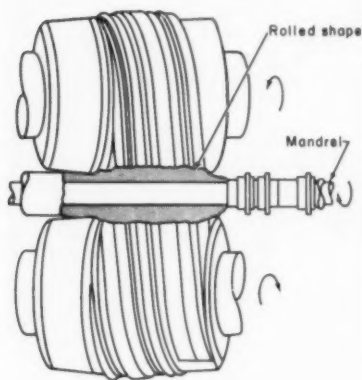
The Yaroslavl Engine Plant machines gears, including the central hole, in a single setting. Correlation between machined surfaces has improved, and costs have fallen. The gear is clamped in a semiautomatic lathe through three holes that are drilled in the web.

The Department of Metal-Cutting Machine Tools and Instruments, Bryansk Transportation Machinery Institute, has shown that hardened gears may be hobbled instead of ground. Hobbed gears are

POWER TRANSMISSION DESIGN

15 per cent harder than ground gears, the Institute reports in recommending them for industrial use.

The All-Union Scientific Research Institute for Planning and Design of Metallurgical Machinery designed a rolling mill for helical rolling of bearing races, bushings, and similar parts.



DC SPEED CONTROL:

The Institute of Automation and Telemechanics has designed a circuit, using magnetic amplifiers, that permits reversal of dc motors, and is highly efficient. The circuit insures a starting time of 0.2 sec, and a reversal time of 0.6 sec.

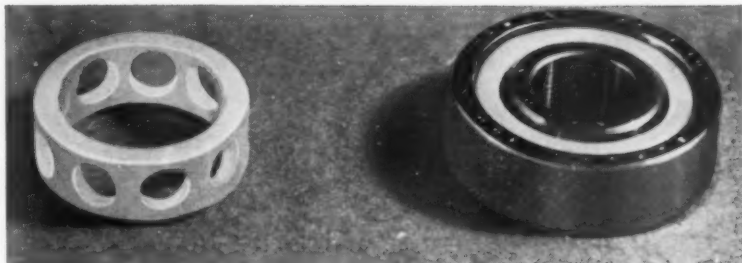
Jeffrey appoints new distributor

Goss Supply Co., Zanesville, Ohio, has been named an authorized stock-carrying distributor for the Jeffrey Mfg. Co., Columbus, Ohio. Clarence A. Goss is president of the distributor company, which will service customers in the Zanesville area with an extensive line of conveyor and transmission merchandise.

Formsprag appoints distributor

General Chain & Belt Co., has been appointed exclusive greater New York area distributor for two other Formsprag products, in addition to the industrial sprag type clutches which they have handled since 1953.

The two additional products are Rawson centrifugal clutches and Rev-Lok dual torque locking and positioning devices. Formsprag bought the Rawson Clutch Coupling Div. of O. S. Walker Co., in 1959.



Oil-filled NYLASINT® retainer helps keep missiles on target



Ball bearing retainers of oil-filled, micro-porous Nylasint have unique resistance to bleeding under extremes of temperature, pressure and acceleration. Leading builders of inertial guidance systems are taking advantage of Nylasint's unique oil-holding characteristics for improved lubrication and performance of gyro rotor bearings. Nylasint retainers prevent navigational errors induced by even the slightest shifting of oil masses.

Sintered from finely divided nylon powder and impregnated with oil, Nylasint parts retain up to 50% (by weight) of the lubricant to minimize friction in bearing and wear applications. Almost 20% of the initial oil is retained at accelerations of 15,000 G's.

Inorganic additives also give resilient Nylasint parts outstanding dimensional stability, high load capacity, and increased wear resistance.

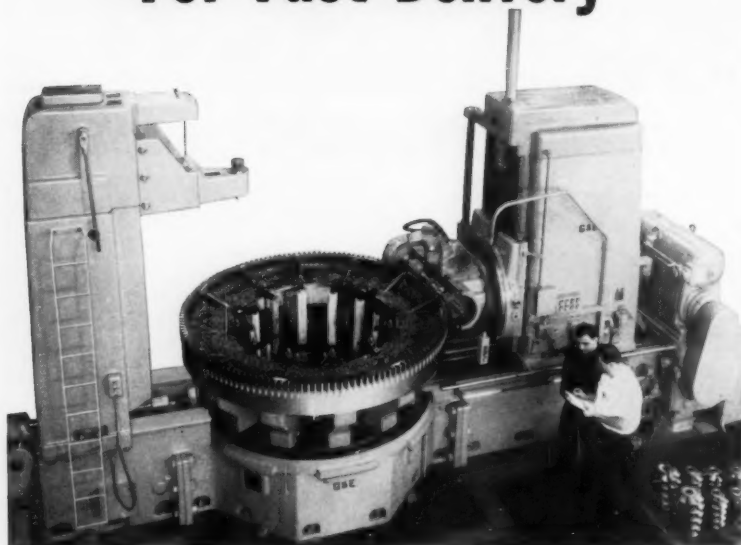
For complete technical data on Nylasint, and its design possibilities, write for new Nylasint Bulletin.



industrial plastics

Halex Corporation
a subsidiary of
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New Production Capacity For Fast Delivery



Large Generated Gears SPUR • HERRINGBONE • HELICAL for a wide range of industrial applications

Gears which must operate smoothly and without vibration at higher speeds and under greater loads must correspondingly be more accurate in tooth profile and spacing.

H & S Generated Gears answer these demands.

Offering the same high-quality standards which characterize the complete H & S Gear line, production capacities for large generated Spur, Helical and Hobbed-Herringbone Gears are now available in the following dimensions:

- Up to 80" outside diameter at 1 DP
- Up to 90" outside diameter at 1 1/4 DP
- Up to 100" outside diameter at 1 1/2 DP
- Up to 125" outside diameter at 2 DP

Face widths up to 42", depending on helix angle

Send your specifications, or let our technical staff make recommendations. H & S specializes in fast production of quality industrial Gearing and Speed Reducers to meet your custom requirements.

Write for Catalog FLB-60



The HORSBURGH & SCOTT CO.

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COMING EVENTS

FEBRUARY

- 9-11 National Society of Professional Engineers, Winter Meeting, Hotel Fort Des Moines, Des Moines, Iowa
- 13-16 American Society of Heating, Refrigerating and Air Conditioning Engineers, National Meeting and 15th International Heating and Air Conditioning Exposition, International Amphitheatre, Chicago.
- 26- Mar. 2 American Institute of Mining, Metallurgical, and Petroleum Engineers, Inc., Annual Meeting, Chase & Park Plaza Hotels, St. Louis.

MARCH

- 5- 9 American Society of Mechanical Engineers, Gas Turbine Power Conference and Exhibit, Shoreham Hotel, Washington, D. C.
- 6- 7 American Gear Manufacturers Association, Bevel Gear Committee, Detroit, Mich.
- 12-16 American Society of Mechanical Engineers, Aviation Conference, Statler Hilton Hotel, Los Angeles.
- 14-15 American Gear Manufacturers Association, Gear Rating Committee, Washington, D. C.
- 14-16 Society of Automotive Engineers, Automobile Meeting, Detroit.
- 20-21 American Gear Manufacturers Association, Aerospace Gearing Committee, Boston, Mass.
- 21-23 American Power Conference, sponsored by nine engineering societies and 14 universities, Sherman Hotel, Chicago.

APRIL

- 1- 3 Council of Engineering Society Secretaries, Hotel Roosevelt, New York.
- 4- 7 Society of Automotive Engineers, National Aeronautic Meeting (including production forum and engineering display), Hotel Commodore, New York.

POWER TRANSMISSION DESIGN



NEW **Dick** SUPLEX oil, grease-defying BELTING

WITH EXCELLENT MECHANICAL EFFICIENCY UNDER ADVERSE CONDITIONS

ANOTHER MAJOR DEVELOPMENT FROM R. & J. DICK —

Suplex Belting has already proved a profitable find in industry after industry. With it there's no slippage or stretch in the presence of grease and oil. Loss of drive efficiency due to oily conditions, machine shutdown for belting maintenance, excessive wear on belting—all have been eliminated.

A STRONG, DURABLE, ALL-SYNTHETIC BELTING

Suplex Belting is a special, oil resistant version of our revolutionary Dixylon Belting and offers all the advantages of Dixylon: its great strength, durability, freedom from stretch . . . will run for years without take-up . . . can be used on small pulley diameters at amazingly high speeds. Available in fractional H.P. up to one thousand H.P.

Versatile, easily fitted to the drive . . . joined on the job . . . smooth, strong joints
. . . made endless in minutes with simple tools.

Get All The Facts About Suplex Belting Now. Send Coupon For Catalog.

R. & J. Dick company inc.
TOTOWA, NEW JERSEY • CLIFFORD 6-6400
Design Leadership
CHICAGO • LOS ANGELES • SAN FRANCISCO • SEATTLE

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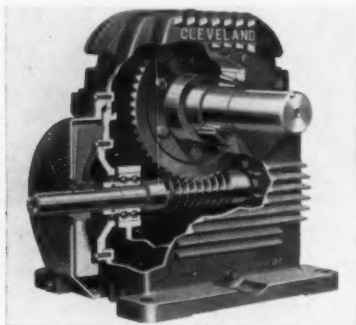
R. & J. Dick Company, Inc.
Dept. 10-B, Totowa, New Jersey
Without obligation to me, please send catalog on
Suplex Oil-Resistant Belting.
Name _____
Position _____
Company _____
Full Address _____

PRODUCT NEWS

To get complete information on these products, use the Reader Service Cards bound into this issue.

Worm gear reducers

Feature of this new line is a light plastic or aluminum radial fan, mounted on the input side of the



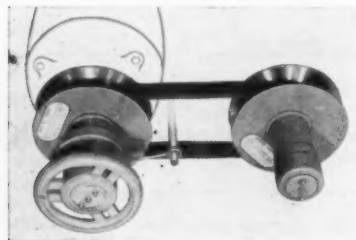
worm shaft, and effective in either direction of rotation. Nine sizes available ranging between 3 in. and 12 in. center distances. Ratios from 4 1/7:1 to 95:1, ratings from fractional to 175 hp. These capacities are said to be up to 80% higher than conventional reducers of the same type.

Eaton Mfg. Co., Cleveland Worm & Gear Div., Cleveland, Ohio.

Circle No. 200 on Reader Service Card

Fixed center drive

This drive (#1325 W) operates on fixed-center shafts. Basic components



are the #1325 W manually operated Roto Cone used in combination with a #1325 spring loaded pulley and a 2 1/2 in. top width variable speed belt.

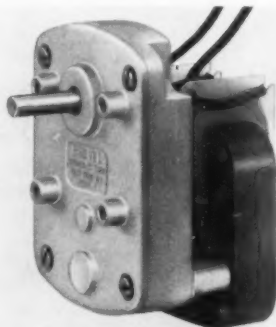
The handwheel is an integral part of the Roto Cone type W pulley; turning it changes the pitch diameters of both pulleys. Rack and pinion gear design provides equal and opposite movement of both discs. Fixed center-line of the V-belt permits both pulley hubs to be on the same or alternate sides. Disc diameters are 13 in. Ratios thru 5:1 at 1750 rpm and thru 7.5:1 with a 1150 rpm motor.

Gerbing Mfg. Corp., Elgin, Ill.

Circle No. 201 on Reader Service Card

Enclosed gear motor

The new FB motor, with the field mounted directly behind the gear housing, has output speeds from 6



to 120 rpm with output torques of 12 in.-lb at 6 rpm for continuous duty. It's a two pole shaded pole type motor which can be geared for a variety of speeds higher or lower than standard, and wound for torques at intermittent loads. The nylon bobbin has been UL tested up to 120 C. External cooling fans available where more torque is needed with limited temperature rise. Helical rotor pinions and linen base phenolic gears in the first stage keep noise to a minimum without power loss. Hardened spur gears and pinions in the other

stages have lifetime lubricated porous bronze bearings throughout. A brake or clutch can be built in without increasing dimensions.

Brevet Products Corp., New York, N. Y.

Circle No. 202 on Reader Service Card

Variable speed pulley

This variable speed motor pulley now comes in ratings from 1 through 15 hp, with output speeds from 2200 to



141 rpm. Speed variation is 3:1, using 1750 rpm or 1160 rpm motors. Simple dependable design, for applications such as pumps, presses, hoppers etc.

Sterling Electric Motors, Inc., Los Angeles, Calif.

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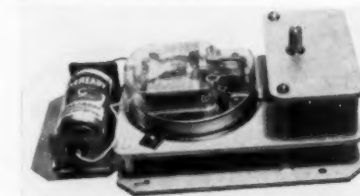
Series wound motors

These 115 v, 60 cycle motors carry continuous duty ratings up to 3/4 hp at 5000 rpm and up to 1 hp at 10,000 rpm. Also available with higher hp intermittent duty ratings and with reversible rotation. Construction details give cast iron housings and open end-to-end ventilation. Motors are designed for end mounting with a housing length of 7 1/4 in., mounting-face diameter 5 1/2 in. and weight of 12.5 lb.

Robbins & Myers, Inc., Springfield, Ohio.

Circle No. 204 on Reader Service Card

Chronometrically-governed motor



Currently used as a clock drive, this 1.5 v motor is suitable for other applications needing high accuracy and

R/M POLY-V® "J" FOR COMPACT DRIVES

Available NOW from Local Distributor Stocks!

The Most Revolutionary Light-Duty Drive

Your R/M distributor now supplies Poly-V "J" belts and sheaves *direct from stock!* Sold only to equipment manufacturers during its introductory period, this light duty drive is now available to meet *your* drive requirements. R/M Poly-V "J" Drive* design incorporates a single, parallel V-ribbed belt running in space-saving sheaves grooved to mate precisely with the belt ribs. Convert to Poly-V "J", and you convert to a revolutionary drive with advantages never before possible for small machinery applications!

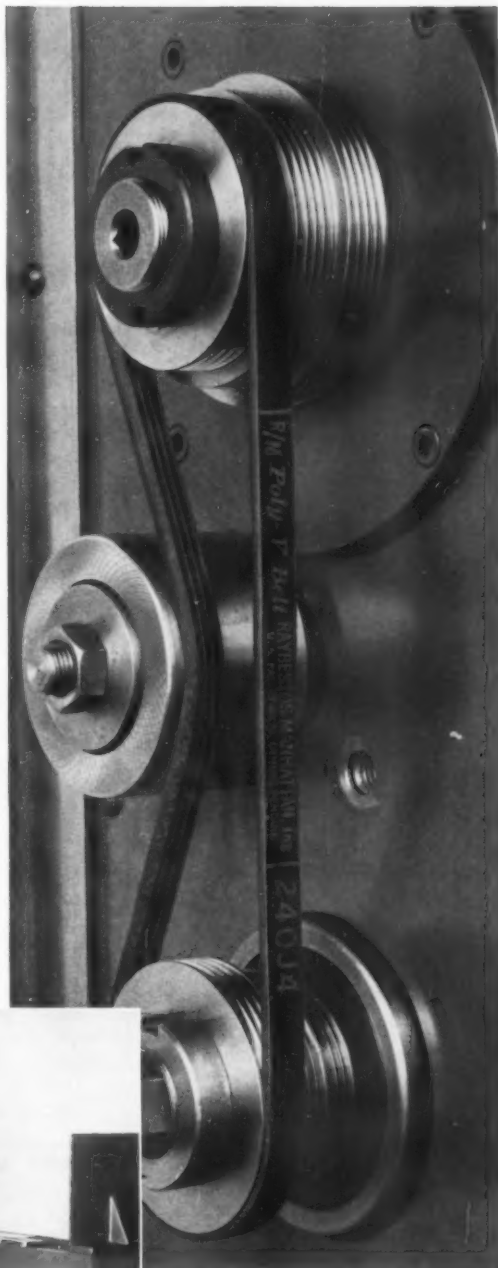
- Designed especially for small sheaves; considerably below V-belt range
- Silent, vibrationless operation; homogeneous traction surface is spliceless, lapless
- ONE belt section meets every need from 1/40 to 15 HP
- No belt matching; a single belt regardless of HP requirements
- Delivers more load in less space; permits more compact drive with smaller mounting clearances
- Ideal for tandem, mule, 1/4 turn or serpentine drives; with reverse bend idlers and for speeds up to 10,000 f.p.m.
- Minimum drive wear; assures longer belt and sheave life
- Complete contact pressure; maintains groove shape

Poly-V Drives Now Stocked from 1/40 to 250 HP

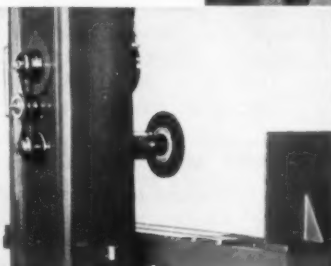
Poly-V "J" *plus* Poly-V sections "L" and "M" for medium and heavy-duty drives are now stocked by R/M distributors to meet your drive requirements from 1/40 to 250 HP . . . and to 1700 HP on order! These three Poly-V belts will replace 8 V-belt sections . . . minimize belt and sheave inventories.

Let an R/M representative show you how a Poly-V Drive can provide "More Use per Dollar" for all the machinery you use or manufacture.

*Patented



Poly-V "J" is ideal for a wide range of small machinery—work-bench power tools, lawn mowers and chainsaws, household appliances, industrial, commercial and scientific machines. It is standard equipment on this Parker Majestic grinder.

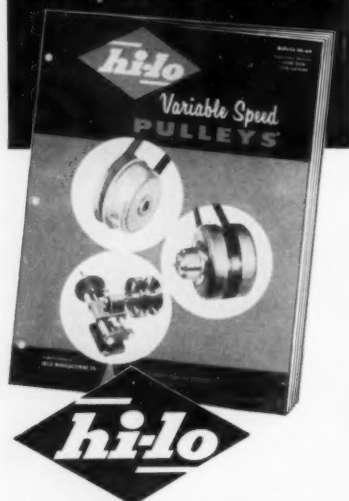


RAYBESTOS-MANHATTAN, INC.
 MANHATTAN RUBBER DIVISION • PASSAIC, N. J.
 ENGINEERED RUBBER PRODUCTS

RM101

Circle No. 27 on Reader Service Card

Whatever Your Vari-Speed Requirement...



has the answer...

- Variable speed pulleys with exclusive cam and cam follower feature that assures constant speed regardless of load variations. Ratios to 2.6 to 1. Fractional to 5 hp.
- Wide V-belt variable speed pulleys with cam and cam follower feature as above. Speed ratios to 3 to 1. Fractional to 5 hp.
- Hi-Ratio variable speed pulleys for economy and exceptional efficiency at speed ratios as high as 7 to 1.
- Dual ratio compound drives to provide a compact unit for obtaining speed ranges not possible with a single pulley.
- Motor bases in a full range of types and sizes: adjustable, tilting and movable countershaft. Also motor frames.
- Wide V-belt sheaves and wide variable speed belts, sizes from .087 to 14.

You'll find the answer to any vari-speed application in Hi-Lo's complete line. Ask for recommendations on your requirement. Request Bulletin HL-60.

Manufactured By
**HI-LO
MANUFACTURING
COMPANY**

affiliate of
**LOVEJOY FLEXIBLE
COUPLING COMPANY**
4991-H West Lake St.
Chicago 44, Ill.

Circle No. 13 on Reader Service Card

PRODUCT NEWS

low current drain such as operating contacts, cams and actuators. The governor's design causes the motor circuit to be constantly pulsed at intervals controlled by a jeweled escapement; when battery voltage is high, the rotor attempts to turn rapidly but shuts off its own current at intervals to compensate for the high voltage; when voltage is low, current flows to the rotor for longer periods, maintaining the rated speed with the accuracy specified. Dimensions are $1\frac{1}{2} \times 2\frac{1}{2} \times \frac{1}{2}$ in., weight 3 oz. Windings for voltages from .5 to 12 vdc. A regulator hand for adjustment in the field is standard.

The A. W. Haydon Co., Waterbury, Conn.

Circle No. 205 on Reader Service Card

Variable pitch pulley

The Congress variable pitch pulley, intended for the air conditioning and heating industry (blowers, furnaces etc.), handles 3L, 4L and 5L belts, comes in three bores, $\frac{1}{2}$, $\frac{3}{4}$ and $\frac{1}{2}$ in.



Basic construction is threaded male and female members. Adjustment is by two splined grooves, 180 degrees apart, which interrupt the external threads. A set screw in the female member provides positive register. Static and dynamic balance of the pulleys is held to .125 in.-oz.

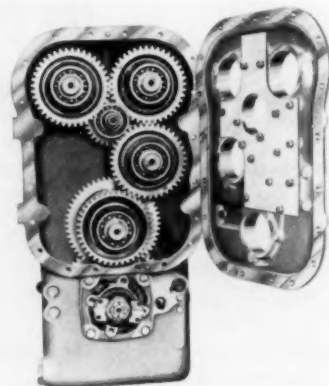
Tann Corp., Detroit, Mich.

Circle No. 206 on Reader Service Card

Power shift transmission

The 2000 series transmissions are designed for use with the Clark 270 torque converter on gas or diesel engines of about 200 lb-ft of torque. Major feature is a system of 4 identical hydraulic clutches, which make available 2 speeds forward and 2 reverse, fully power shifted. A manual range selector provides 4 speeds in each direction, with reduction ratios of 4.78 and 2.53 in the two lower

gears and 1.31 and 0.69 in the higher gears. Clutches are operated by hydraulic power from a pump on the torque converter, are mounted by 4-bolt side mounts. Removing the back



cover plate allows you to get the internal components without dropping the transmission.

Clark Equipment Co., Automotive Div., Jackson, Mich.

Circle No. 207 on Reader Service Card

Vibration and shock switch

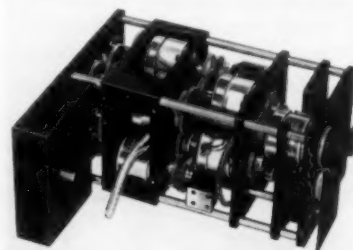
For use on engines pumps and compressors, this switch (Model VS-1) is sensitive to abnormal oscillation in two planes of motion. It is easy to adjust with a screw driver while equipment is working. Can be wired to ground ignition, sound alarm, control panel lights, or operate valves to shut off fuel, or electric motor controller circuits. Cost of the VS-1 is \$29.50, or explosion proof model, \$53.

Frank W. Murphy, Mfr., Inc., Tulsa, Okla.

Circle No. 208 on Reader Service Card

Multiple speed transmission units

Units consist of two or more gear trains with friction disc electromagnetic clutches inserted between them.



The desired speed ratios are produced by energizing one or more clutches to couple the gear trains in appropriate combinations. Speed changes can

POWER TRANSMISSION DESIGN

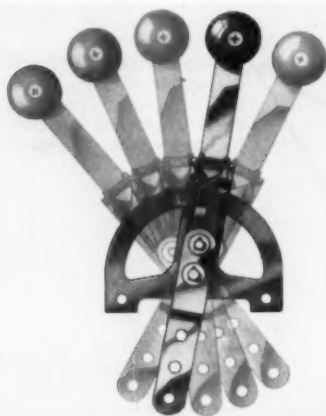
be made automatically by sequencing switch or programmer, with push buttons, or remote control by a direct wire hook up or through a telemetering system. A compact design, it uses certain gears and trains for more than one speed ratio. Produced in 2, 4, 15 and 30 speed units with various ratios for both high and low speeds. Class IV high precision gears on the two speed model, Class I on all others. Applications include computers, instrument and control mechanisms, and fractional hp devices.

Autotronics, Inc., Florissant, Mo.

Circle No. 209 on Reader Service Card

Quadrant control mechanism

An infinite-positioning, self-locking quadrant control called the Quadra-stat may be either hydraulically, manually or motor actuated. It uses



a patented automatic self-locking principle which prevents any change in setting caused by motor vibration or other forces acting through the driven lever. No gears, ratchets or friction devices. Made in various sizes and configurations to suit installation requirements.

Adams Rite Mfg. Co. Glendale, Calif.

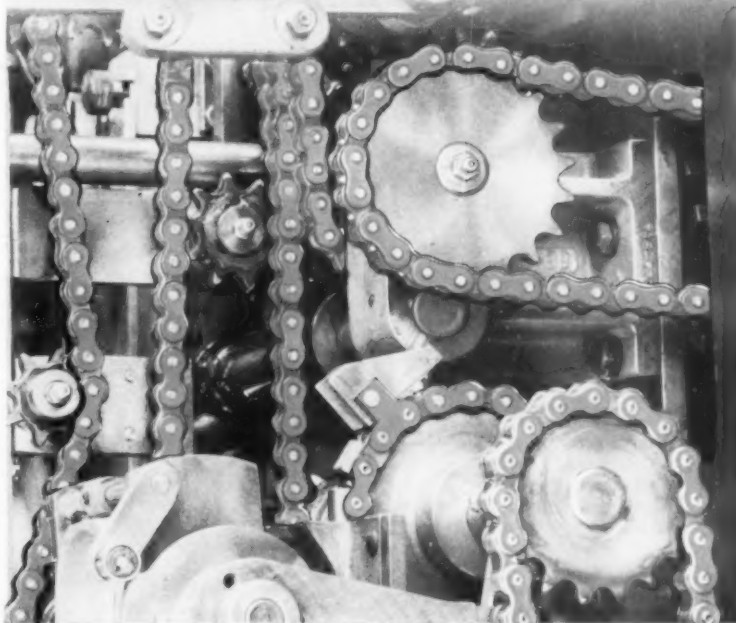
Circle No. 210 on Reader Service Card

High temperature lubricant

Surf-Kote L-1020 contains a modified molybdenum disulfide compound in a synthetic base which evaporates and leaves a dry film of lubricant on most metal surfaces. For use under high temperature (to + 750 F) and high pressure conditions, it will not deteriorate or form carbon deposits when used for lubricating kiln car wheels, conveyor bearings, furnace hinge pins etc. Can be applied directly to load bearing surfaces, or through

Continued on page 50

FINISHED APPEARANCE CREATES BETTER ACCEPTANCE



Acme Chains are chemically processed in special electronic furnaces to produce a distinctive chemically blued steel, on the side plates of all chains, for better appearance. This process — originated by Acme's Engineers — give the precision made chains a much better appearance.

The gleaming blue lustre of these chains when used on machinery — as shown in above photo — greatly enhance their appearance and sales value.

All Acme Chains are built in conformity with A. S. A. standards and are available from 1/4" pitch to 2 1/2" pitch.

Your local distributor carries a full line of Acme Roller Chains and is well qualified to help you in selecting the right chain for the right purpose. Call him for prompt service.



Write Dept. 28-Q
for new 111, 100 page catalog
with engineering section.



RELIABLE CHAIN DRIVES FOR ALL INDUSTRIES

ROLLER CHAINS, SPROCKETS, CONVEYOR CHAINS, FLEXIBLE COUPLINGS, ATTACHMENTS. (Special and Standard)

Circle No. 1 on Reader Service Card

Engineering Data

WINSMITH
SPEED REDUCERS

WINSMITH "C" SERIES WORM GEAR SPEED REDUCERS

CAST IRON HOUSINGS
designed for high heat radiation. One-piece construction, close-grained gray iron for maximum strength and rigidity

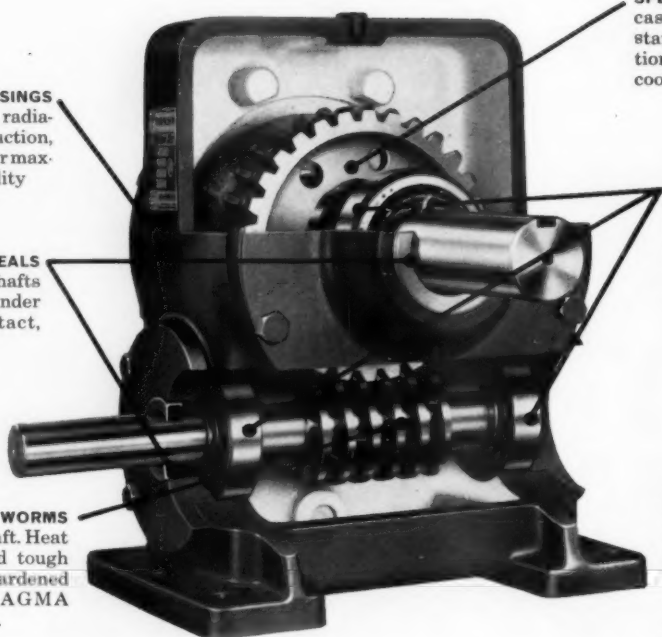
POSITIVE OIL SEALS
keep oil in, dirt out. Shafts lapped to micro-finish under seals for uniform contact, longer seal life.

CASE-HARDENED STEEL WORMS
cut integral with the shaft. Heat treated for close-grained tough core, carburized and hardened before grinding. Meet AGMA long-wear specifications.

SPECIAL BRONZE WORM GEARS
cast to recommended AGMA standards. Low coefficients of friction and thermal expansion for cooler, more efficient operation.

TAPERED ROLLER BEARINGS
for minimum maintenance, long bearing life, permanent shaft alignment. Capacity to handle high radial and thrust loads.

AVAILABLE in single and double reduction models, for intermittent or continuous service. Order from stock with right-angle or parallel shafts, worm on top or bottom, all worm gear or combined worm and helical. All types of special units also available.



- 108 Models
- 1/100 to 34 H.P.
- Ratios 5:1 to 4460:1
- Max. Output Torque 142 to 34,767 in. lbs.

Winsmith "C" Series Reducers are compact units which offer a wide range of horsepower and torque output in minimum space. Their design and construction provides high shock load resistance; maximum thermal capacity without induced cooling; greater overhung load capacity; all moving parts totally enclosed in a dirt-proof housing and lubricated from a central oil bath; and complete interchangeability of major components. These features add up to smooth, trouble-free performance—an extremely low rate of wear—high mechanical efficiency—and greater overall economy per horsepower dollar.

For complete information on Winsmith Speed Reducers, write today or call your nearest Winsmith Representative. You'll find one in every major industrial area, listed in the Yellow Pages. They are technically trained experts who are always ready to help you with any speed reducer problem. For both standard and special power transmission applications, you'll find it pays to standardize on Winsmith.

WINSMITH, INC.

204 Eaton Street, Springville, (Erie County), New York



• • • Winsmith Speed Reducers are made by American craftsmen to meet American design and production standards.

Circle No. 36 on Reader Service Card

POWER TRANSMISSION DESIGN

FEBRUARY 1961

CELOTEX

THE CELOTEX CORPORATION
LAGRO PLANT
LAGRO, IND.

GENERAL OFFICE
CHICAGO, ILL.

August 17, 1960

The Editor
Power Transmission Design
812 Huron Road
Cleveland 15, Ohio

Dear Sir:

I have a suggestion that I think would help the man in the plant, like myself. It concerns clear and adequate marking of power transmission components. Many manufacturers fail to clearly mark the size and other pertinent information on these products.

Some of the specific products with which I've had trouble and feel there is room for improvement are:

1. V-belt sheaves
2. Roller chain sprockets
3. Some kinds of chain, including attachment links.
4. Pillow blocks and bearings which should have size plainly marked, not just a number like P332.
5. Gears -- These should have number of teeth and tooth type, such as 14-1/2 deg. involute, marked.
6. Gear reducers -- Some name plates don't even have reduction ratio marked.
7. In some of the previous cases, all needed information is there but it's on a decal or label which soon disappears in the kind of service seen in our plant.

You'd be doing me, and I'm sure other users of power transmission equipment, a favor if you passed this comment along to manufacturers of these and similar types of equipment.

Cordially

THE CELOTEX CORPORATION,
Lagro Plant

D. R. Dewart
D. R. Dewart
Plant Engineer

Can power transmission component marking be improved?

"WELL, CERTAINLY POWER TRANSMISSION COMPONENTS should be plainly marked!", we said, after reading Mr. Dewart's letter. So, to comply with his request to pass his comment along, and to let component manufacturers have their say, a letter was prepared and mailed to nearly 300 manufacturers of various types of power transmission components.

The letter included Mr. Dewart's comments and asked these manufacturers for their views on the sub-

ject. Nearly 20% of the manufacturers contacted replied. Most of them agreed, in principle at least, with Mr. Dewart. The majority of those replying told us they felt they were doing what was requested. Some offered what are to them valid reasons for not doing a thorough job of marking, and some gave what seemed to us to be valid reasons for not doing as complete a job as users would like.

But, why don't you turn the page and read . . .

COMPONENT MARKING

What the component manufacturers had to say

BEARINGS . . .

"... our bearings are so small that nobody could read the sizes unless they used a microscope. And this would be pretty impractical. About a year ago, the miniature bearing manufacturers got together and agreed on standard markings to identify the manufacturer of a miniature bearing. These markings also show correct loading faces of preloaded pairs."

(This seems valid enough)

"This question of bearing numbers and identification has been the subject of discussion for many years in the bearing industry. Attempts have been made to standardize bearing numbering procedures, but it has been extremely difficult, apparently due to the many variations in bearing design."

"A bearing package bears a part number indicating radial play, type of lubricant, and the date the product was packaged. The bearing itself shows only the basic part number, however. Field identification is, therefore, most difficult."

(From these replies and other like them, it seems that bearing manufacturers feel there's little point in anything so simple as just marking the bore and ID)

"Concerning item 4 (pillow blocks should be plainly marked, etc.) a single housing is used for various shaft diameters with only the ID of the bearing itself

being the variable. To cast the housing with a specific shaft size would be quite expensive."

(This seems quite reasonable, but the following two comments seem to show that it's possible to do what Mr. Dewart asked.)

"All our mounted blocks, except cartridges, show the size on the nameplates. Incidentally, the nameplates are all metal. We too have found decals to be unsatisfactory."

"We make several sizes of pillow blocks and, I think, have adequately covered the marking situation. Our pillow blocks carry a riveted metal plate conspicuously displayed that shows the shaft size. For example, a pillow block for a 3/4-in. shaft bears the nomenclature PB-3/4. We experimented with a self-adhesive vinyl plastic label, but decided on the riveted metal plate as more permanent and easier to read."

BELT DRIVES . . .

"Except for short, pot-cured V-belts, we indent the belt size of all our industrial belts. Also, we brand each belt with a permanent vulcanized label applied during curing. On shorter belts and fractional horsepower belts, we are working on similar permanent identification. For the present, we heat emboss these."

"Our V-and positive drive belts are clearly and completely identified and we have no intention of changing our procedure."

"Whenever possible, we stamp our woven endless belts with detailed size information. But, we are often asked by our customers to show their part number only. In such cases, we must comply. Our stamping will erase while in operation."

"We stamp size on all sheaves and bushings."

"We emboss a symbol indicating cross section on the studs used in assembling our V-link belting."

AVIATION PRODUCT ENGINEERING CO	
BEFORE STARTING FILL WITH <input type="text"/> QUARTS OF <input type="text"/> OIL	
HP <input type="text"/>	OUTPUT, RPM <input type="text"/> NEMA TYPE <input type="text"/>
PHASE <input type="text"/> V, AC MOUNT LEVEL, FEET DOWN	
TEMP	VISCOSITY, SSU
0-50F	300-400 at 100
50-125F	60-90 at 210

For a gearmotor

What's a good nameplate?

Here are some hypothetical

samples of what good name-plates should include to be really useful.

For a variable-speed drive

VARIABLE-SPEED DRIVE	
HP <input type="text"/> RATIO <input type="text"/>	TURN SPEED ADJUSTMENT HANDLE ONLY WHEN UNIT IS RUNNING-FILL WITH <input type="text"/> QTS OF <input type="text"/> OIL BEFORE STARTING
MAX. INPUT RPM <input type="text"/>	
OUTPUT RPM <input type="text"/> MAX MIN <input type="text"/>	
SERIAL NO. <input type="text"/>	
MACHINE MANUFACTURING CO	

"We think we mark our V-belt sheaves clearly and concisely on the sheaves themselves as well as on the package."

(No one in this group would admit that they don't do a good job despite Mr. Dewart's comments. But there were quite a few who didn't reply to our letter.)

CHAIN AND SPROCKETS . . .

"All our stock sprockets are marked with pitch, style, and bore size. Boxes also carry this information."

"Although we've marked our chain drives in a way we think is adequate, there have been times when our customers told us the marking was not sufficient. We, therefore, have taken steps to be of great assistance to our customers when they want replacements."

"We're aware of the things Mr. Dewart mentioned and the confusion they can cause. For instance, we know of one chain maker who, until recently, identified three different chain models by the same part number stamped on all outer link plates. On the other hand, it's not uncommon to have the same chain model identified by a different number by different manufacturers. Sprockets are seldom identified by the same system from manufacturer to manufacturer."

Fortunately, the roller chain industry has made progress along these lines. All American producers of roller chain now mark basic chain models identically. But, some not so widely used types will, unfortunately, continue to be identified by numbers established by manufacturers long ago, and because they are included in the parts manuals of many users will probably never be changed.

Some manufacturers of roller chain sprockets persist in identifying their products with numbers completely unrelated to their identity. We know of no way

to justify or explain this practice, except that it forces the user to go back to this manufacturer for replacement. It would really benefit the user if all manufacturers adopted a standard identifying method."

(We're sure that all users would agree with the last statement. Also, it seems that forcing the user to go back to a manufacturer for a replacement part may be behind the identifying practices in many fields.)

"It would add considerably to chain cost if we were to mark attachment links with an identifying number. This is because marking would have to be done before the stage of manufacture where the link is classified as a straight or bent link, with or without holes, and for one or two sides. Inventory and other costs associated with keeping track of all the different pieces would certainly raise the price."

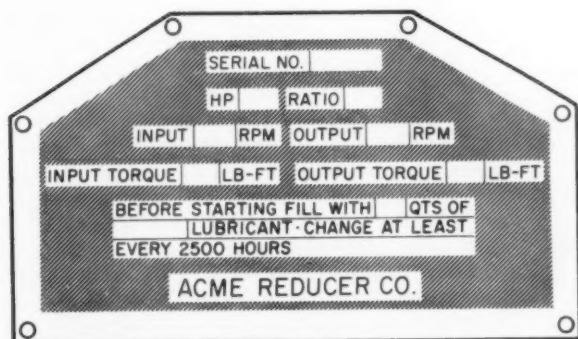
(Here's some real food for thought. Will chain buyers pay a premium for complete and adequate marking? Or, would a manufacturer find that the business went to the company producing inadequately marked but lower priced products?)

"Our chains are marked and properly identified with the exception of some of the attachment links. We're now starting a program to fully identify these. This program was started because we're very much interested in user reaction."

(Here's someone who's going to find out whether adequate marking pays off. Perhaps they've figured out a way to keep from having to raise the price.)

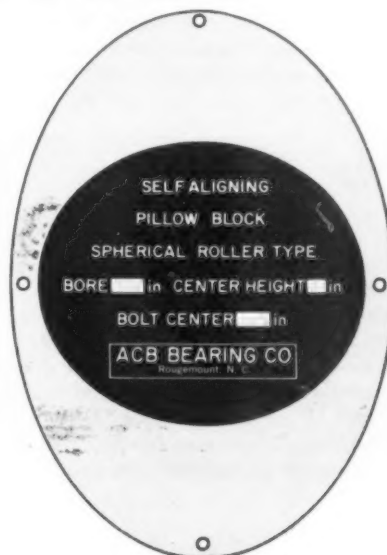
CLUTCHES . .

"We feel it's only good sense and good business practice to clearly identify each one of our products. We



For a speed reducer

For a pillow block



COMPONENT MARKING

know that our purchasing department and operating people appreciate this approach when they have to buy replacement parts. Specifically, we mark a clutch by size and type as well as giving our name and address. The marking is rolled into the metal. We assume that almost all manufacturers follow this policy and therefore realize that our comments add nothing new to a reasonable approach to this problem other than subscribing to it heartily."

(We couldn't resist including the last sentence of this excerpt from a letter from the vice president of a well-known clutch manufacturing firm. Our impression is that he doesn't have as much company as he thinks.)

"We confess. We have used stick-on labels in the past. Now, we're using cast-in lettering, engraved nameplates, or stamped-in numbers. In defense of so-called inadequate marking, we'd like to point out that too much information may prompt the user or salesman to ignore the catalog. This can result in improper selection in the case of products like clutches and torque converters. Where there's only a catalog number, the catalog must be consulted and proper selection is much more likely."

(This sounds like a very good point to us.)

"Your letter really struck home. We're in the throes of redesigning and revitalizing our marking and packaging of clutches and brakes. First step in the program is a pressure sensitized Day-Glo label on the clutch housing. We agree that decals quickly disappear, but these labels are supposed to hold up. We'll know the answer to this from experience, soon. Also, we're stamping the inner part of the clutch with dies, and we anticipate going one step further and marking the sprockets in the case of sprocket-type clutches with the number of teeth and chain size."

COUPLINGS . . .

"We definitely put a serial number on all couplings other than the rough bore type. This identifies the coupling so we can reproduce it if necessary. In addition to the serial number, we stamp on the periphery of the flange our trade name and address. We believe this gives the customer enough information to identify them."

GEARS . . .

"Gears we make and sell are generally very large custom-made gears from 6 to 24 ft diam. We feel there's little interchangeability possible so we just stamp our identifying number and drawing number on them."

"We do identify our products just as your reader suggests—with one exception, gears. Gear specifications are so complex that too much space would be needed for adequate identification. A code number stamped on each of our gears refers to a detailed drawing at the factory. This insures an exact replacement."

"In reference to marking number of teeth and tooth

type on gears, we have never had such a request from a user of our products."

(Maybe all that's needed to get things marked the way you want them, users, is to tell the manufacturers.)

"We agree that clear and complete marking is most important. But, some of our gears are so small there isn't much useable surface for marking. So, we use a code. Some of the stock gear manufacturers use very similar codes. Others have different systems. It would probably be costly for all manufacturers to adopt the same system."

"There is undoubtedly some merit to having tooth type, number of teeth, and other information marked on gears. Where we have a proprietary interest in a gear because of design or other contributions, we usually don't put this information on the gear. Nor do we put it on a gear enclosed in a unit we fully design and engineer. When supplying open gearing to customer's drawings, however, we're happy to put this information on the gear, and often do."

"Purchasers of gears in the original equipment market may not want specific data marked on them because they enjoy a replacement business."

GEARMOTORS, SPEED REDUCERS, ETC. . .

"... we go on and beyond the requirements your reader stipulates. In addition to ratio on the reducer nameplate, we show style, assembly, and serial number."

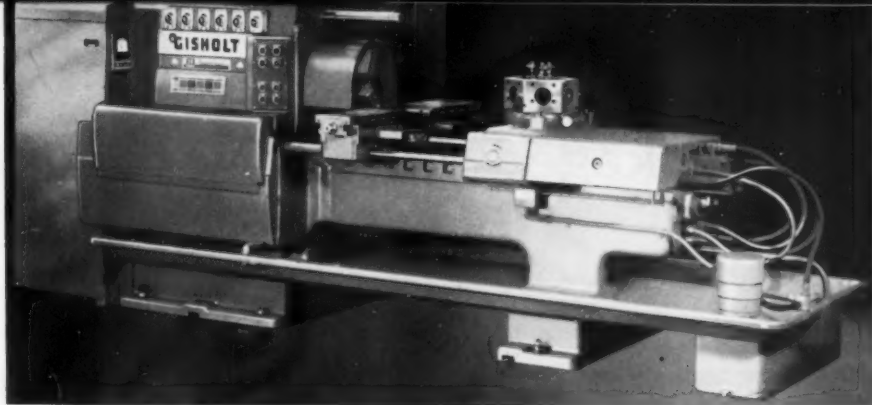
"Our nameplates include: input speed, output speed, hp rating, ratio, and lubricant recommendations, as well as our model and serial number. The metal nameplates are of a type and quality to last 20 to 25 years under harsh field conditions."

(This comment is typical of many received from manufacturers of gearmotors, speed reducers, and other types of enclosed gearing. Establishment of standards by the AGMA seems to have brought about better and more uniform marking practices in this product category than any other.)

An across the board comment . . .

"There's an old axiom that the customer is always right, but special customer requirements and his demands for the most for the least make us look for every possible production saving. This drives us away from any operation which costs money but doesn't improve performance. The decals mentioned by your reader are used as nameplates for this reason."

(Here, again, cost is mentioned. From the manufacturer's standpoint, this is a very good reason. Because when the decision to buy is made, there are probably few, if any, who would pay more for something just because it was better marked. But, and here's the real moral of this story, if users of power transmission equipment want better marking, we're sure that all that's needed to get it, is to ask for it, and assure the manufacturer's that it's worth what it costs you.) ♦



RAPID SPEED-UP to cutting velocity and instant slow-down after the job is finished may be reasons for the name of the Fastermatic Lathe. More time-saving results from the pushbutton speed-changing feature.

Electric clutches select constant cutting speeds

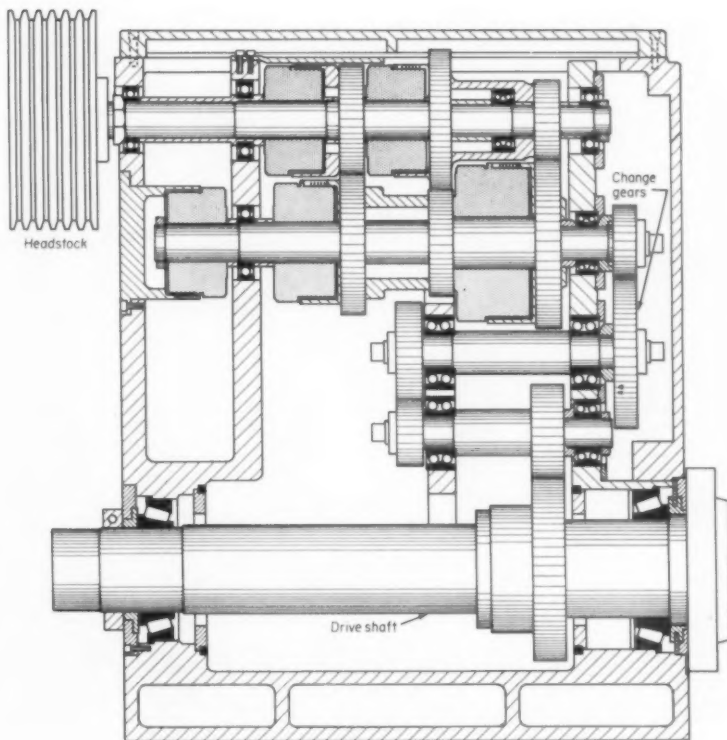
TURNING SPEEDS TO SUIT the cutting diameter of the workpiece can be applied at the touch of a button in a lathe that makes full use of electric clutches.

Chief engineer of Gisholt Machine Co., Madison, Wis., E. C. Helmke, claims the Fastermatic Automatic Turret Lathe is shock-free and fast, for pieces having varied diameters to be cut.

The headstock of the Fastermatic has four electromagnetically operated multiple disc clutches, and one electric disc brake. One clutch starts the headstock spindle, and another (which engages as the first disengages) brakes the spindle so the workpiece can be handled faster.

Two other clutches are linked in an unusual bypass arrangement on the spindle drive, so that four different spindle speeds can be obtained by engaging and disengaging these clutches. Change gears are also standard equipment with the lathe, but obviously, they are not changed as often.

"Reasons for using electric clutches," says chief engineer Helmke, "are self-evident. They are easier to control, and need less main-

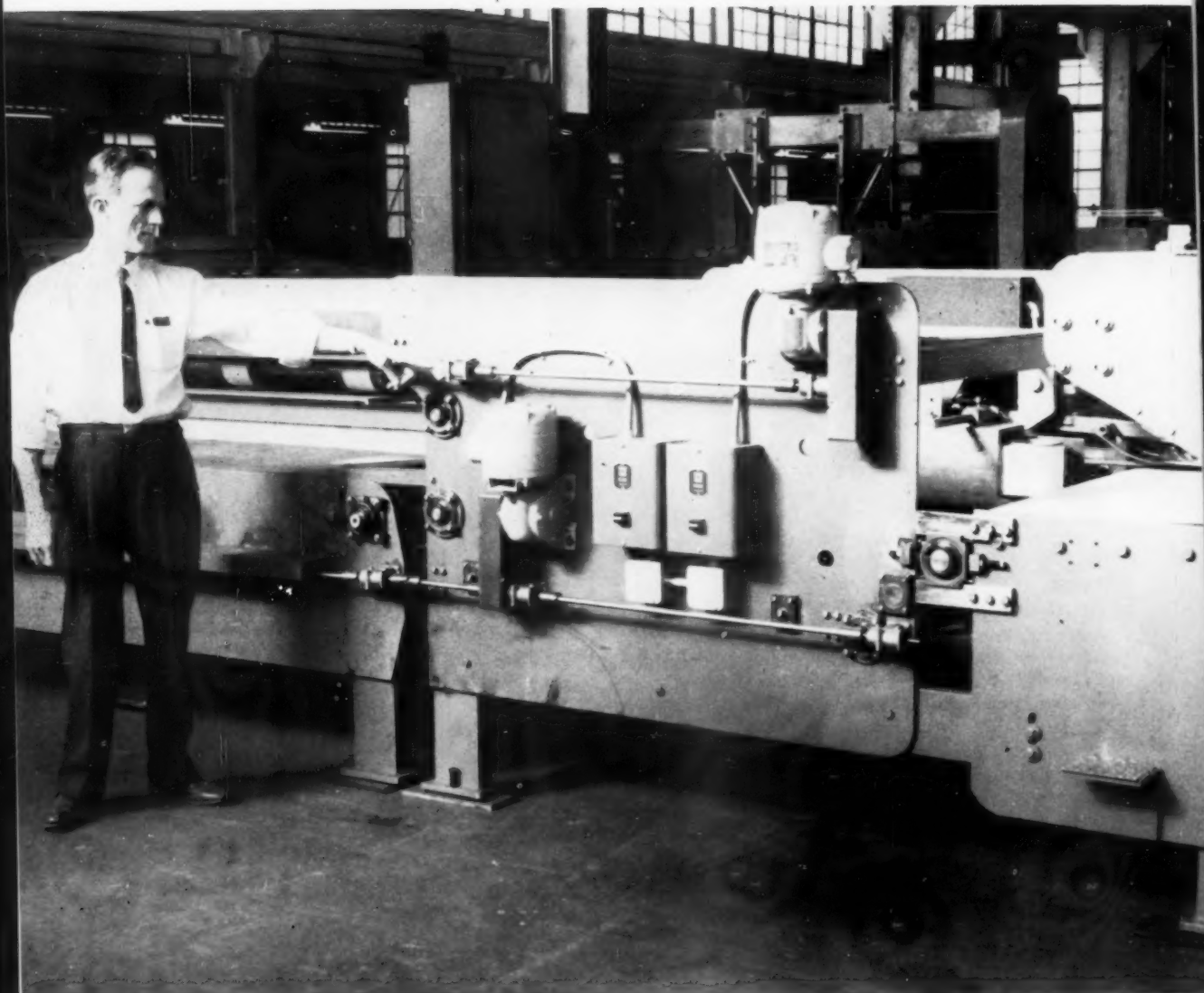


tenance and servicing. Hydraulic clutches, for instance, have additional solenoid valves; mechanical clutches require actuating cylinders that have to be adjusted fre-

quently. Electric clutches are also more compact."

A bonus for the electric clutch: the ease of conversion to numerical (tape) control. ♦

Packaged units for economy



JOHN LOPEZ EXPLAINS how five gear units (can you find them?) increase the versatility of the Comet box gluer and folder. Off-the shelf mechanical components can do many jobs in machinery, and free the company's product engineers for creative work.

Photos courtesy Airborne Accessories Corp.

ALMOST EVERY COMET folding and gluing machine that Universal Corrugated Box Machinery Corp. makes is different. Yet, they are all production items. By using standard components that can be arranged to transmit power in any required direction, the company can fit the same basic machine to almost any floor arrangement. Earlier models used chain and sprocket drives. These, they found, needed special safety guards for each different floor plan.

PACKAGED COMPONENTS INSTEAD OF CUSTOM-MADE mechanical drives save the equivalent of an extra engineer's time every year, says the Universal Corrugated Box Machinery Corp., Linden, N. J.

Universal expects these advantages by using off-the-shelf-drives:

- Design time savings
- Reduced customer maintenance costs
- Simplified purchasing and inventory.
- Added safety, because fully enclosed ready-made drives normally substitute for open gearing and chains.
- Simplified construction
- Good synchronization—minimum backlash

John Lopez, Universal's chief engineer, cites as an example of proper use of a packaged unit, the extensive use of a sealed right angle gear unit. It is a compact, right-angle bevel gear package, sealed and lubricated for life. It can provide for manual or power transmission of motion; for 2- or 3-way power takeoff; gear ratios of 1:1 and 2:1; and from $\frac{1}{3}$ - to 5-hp capacity.

Universal took care of three completely different design problems on its new Comet box folding and gluing machine, with 13 of these packaged drives. The Comet is a production machine that needs built-in quality and precision. It takes scored corrugated blanks of cardboard at high speed, and folds and glues them into flat boxes ready for shipping.

A typical production line has thousands of moving parts, numerous handwheels and other mechanical adjustments, and many separate drive motors—some with several take offs. Applications of the units, on the Comet and its companion bundle-ejector include: A pallet height adjustment at the outgoing end of the ejector (manual).

A motor-operated, push-button controlled feed and squaring adjustment on the gluing operation (semi-automatic).

A vibrating paddle aligner on the pallet stacking end of the bundle ejector (fully automatic).

Squaring Adjustment

For precise squaring, two moving parallel belts are

adjusted to the exact width of the blank. After gluing, panels of the folded boxes pass between these belts, and are aligned. Automatic filling and sealing machinery will not function properly unless boxes are square. The Comet can square up to 1,000 boxes a minute.

The squaring mechanism must be adjusted to suit various sized boxes. Four motor-powered, push-button controlled, lead-screws that span the width of the squaring section operate in unison from a single motor. They move the parallel belts together or apart by moving one side of the squaring machine relative to the other.

Eight gear boxes are used to transmit power from the dc drive motor to the lead screws. Two more of them adjust the feed guide that positions the boxes as they enter the squaring mechanism, through another power takeoff.

Simplicity in design and negligible backlash mark the packaged bevel gear drive. All four lead screws are closely synchronized, without binding and with very little friction.

Safety through the elimination of side panel housings for hazardous moving parts provides an extra bonus.

Eccentric Take-Off

The bundle ejector stacks flat boxes for palletizing. One gear unit drives two sets of paddles set at right angles to one another. The paddles align boxes before they are fed onto the pallet stack. A bar linkage connected to the drive motor through a cam eccentric (which provides the oscillatory motion), drives the gear unit. A second eccentric smooths out the off-center motion induced by the first, so that the motor can also be used to power an additional roller.

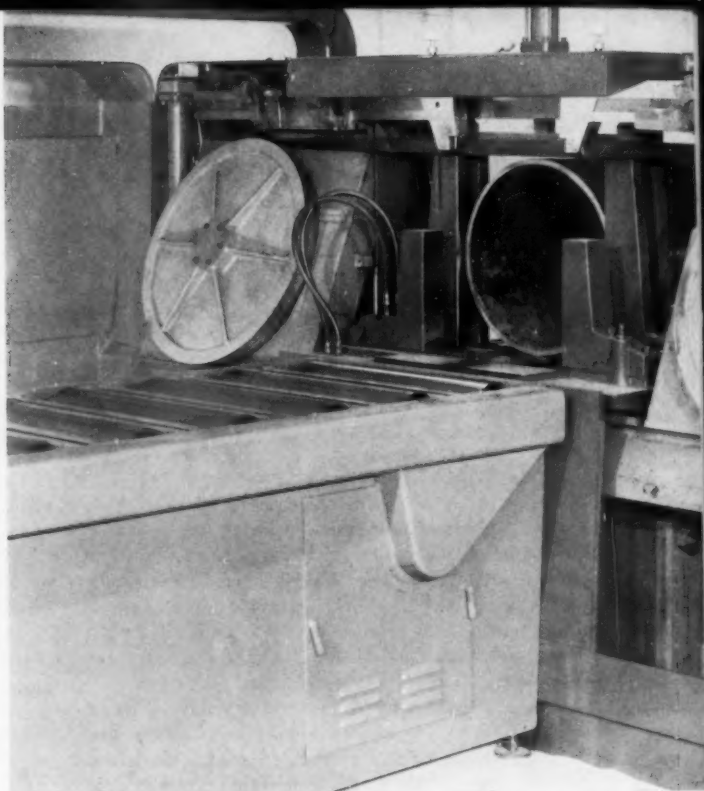
Handwheel Setting

Two more gear boxes on the bundle ejector drive the bundle height-setter. A handwheel operated shaft is connected by two gear units to the two lead screws at either end of the ejector frame.

Universal says that for the thirteen right-angle power transmission points, they needed only two types of gear units—the two-way, and the three-way models. ♦



Better bandsaw built with hydraulic drive



HYDRAULICS POWER A SAW for the first time in a machine that takes full advantage of the cutting ability of a 2-in. wide high-speed steel saw band.

The saw, based on a new principle, uses the top portion of the saw band for faster, more accurate cutting. Early version of the DoAll Co., Des Plaines, Ill. machine was so successful that they decided to adapt the basic design to more diverse applications. Biggest design problem encountered was that of providing a variable-speed drive for the band which still allowed it to move up and down in the cutting plane.

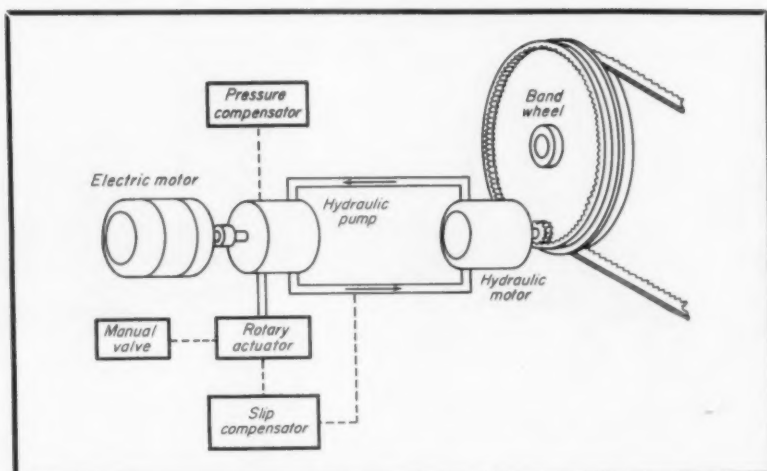
Direct electric drive was too bulky, and indirect

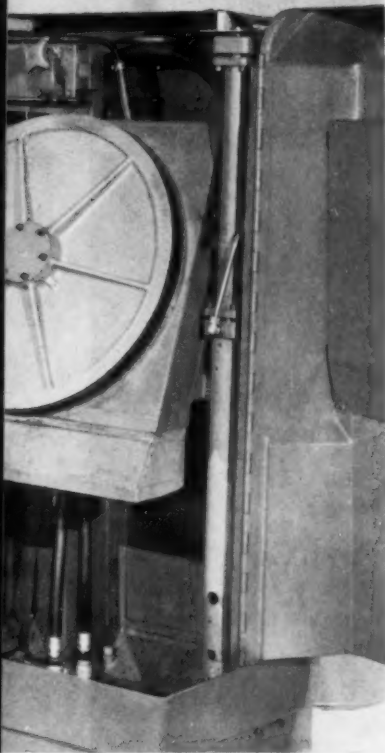
mechanical drives suffered from extremely heavy power losses. The solution was found in a hydraulic motor, with its inherent high power to weight ratio, and flexible line connections. A summary of advantages of the hydraulic drive is contained in the table.

DoAll model C-24 power saw compactly integrates a 24 in. by 24 in. cutting head, main vise, hydraulic system, coolant system, and movable control console. A 15-hp electric motor furnishes power.

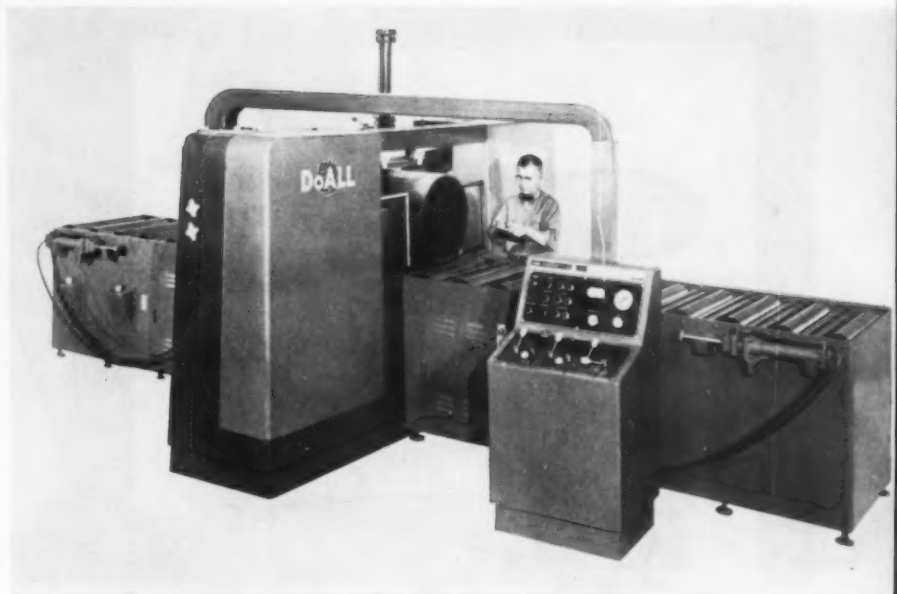
Hydraulic motors driving directly on each band wheel assure efficient transmission of the available power with tool speeds from 20 to 200 ft per min. ♦

A SLIP COMPENSATION feedback system developed for the saw keeps the band speed constant despite fluid pressure variations of possibly 800 psi during cutting. The compensating system positions a variable displacement pump to supply a larger fluid volume to the hydraulic motor as the pressure increases.












SAW BLADE ENCIRCLES the work, cutting with its inside edge from the top down. Hydraulic system provides power to turn the band drive-wheels smoothly, doesn't add much weight for the motor that raises the cutting head.



DRIVE SYSTEMS COMPARISON

DESIRED CHARACTERISTICS	Remote Powered				Direct Mounted		
	Splined Shaft		Universal Joint				
							
	Electrical Variable Speed	Mechanical Variable Speed	Electrical Variable Speed	Mechanical Variable Speed	Electrical Variable Speed	Mechanical Variable Speed	Hydraulic Variable Speed
COST — Lowest commensurate with other requirements.	Poor	Good	Good	Poor	Good	Poor	Good
STRUCTURAL CONSIDERATIONS Practical size Practical weight Minimum enclosures required	Possible Good Good	Possible Good Poor	Possible Good Poor	Possible Good Possible	Poor Poor Poor	Poor Poor Possible	Good Good Good
MECHANICAL CONSIDERATIONS 7 hp. continuous power 10 to 1 stepless speed range Close speed regulation $\pm 4\%$ Efficiently satisfy minimum band requirements Provide power for other machine functions	Good Good Good Poor Poor	Good Poor Possible Possible Good	Good Poor Possible Possible Good	Good Good Good Poor Poor	Good Poor Possible Possible Possible	Good Good Good Poor Poor	Good Good Good Good Good
SERVICE CONSIDERATIONS Minimum guards and safety precautions Accessibility of working parts Ease of chip and coolant protection Utilization of standard components	Good Good Poor Good	Poor Good Poor Good	Poor Good Possible Good	Poor Good Possible Good	Poor Poor Poor Good	Possible Possible Poor Good	Good Good Good Good

*Need a better drive
for a machine?*



Ask your local Gates Engineer to show how Super HC Drives save space, weight, money

If you are designing a new machine or redesigning one for better performance, your local Gates Field Engineer will be glad to help you. He can show you how to take full advantage of the many opportunities offered by Gates Super HC High Capacity Drives.

Ask him to design a drive for your machine two ways: A conventional V-belt drive and a new Gates Super HC High Capacity V-Belt Drive. A quick comparison will show you many of the important savings provided by the new Gates drive.

Manufacturers everywhere have standardized upon the Gates Super HC V-Belt Drive—industry's first and most advanced high capacity drive. It is your best assurance that your power transmission unit will not soon become obsolete.

Your local Gates Field Engineer is an experienced, fully-qualified drive design expert. Contact him for drive design help.

The Gates Rubber Company, Denver, Colorado

BP-13

Gates Super HC Drives give you these benefits:

Handles up to 3 times more hp than conventional V-belts in same space.

Saves up to 50% in drive space.

Reduces drive weight 20% and more.

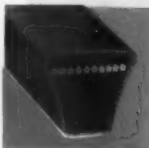
Cuts drive costs as much as 20%.

Reduces bearing load, increasing bearing life.

Guards can be smaller, lighter weight.

Belt speed up to 6000 ft/min possible without dynamic balancing.

Less costly, higher speed motors can often be used.



Exclusive design features include: precisely engineered arched top, concave sidewalls, Flex-Weave cover, super strength tensile construction.



Gates Super HC V-Belt Drives

Building the future on
50 years of progress

Latched gear sequences clutch operation

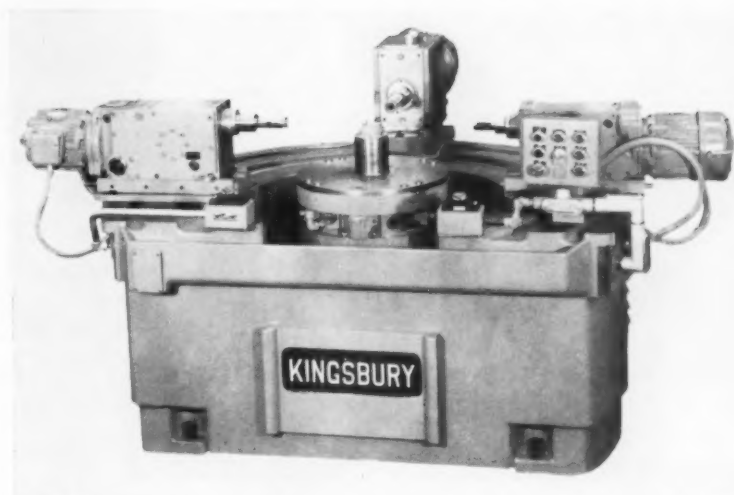
INTERPLAY OF A SHUTTLE-TYPE latch and a friction clutch sequences a drilling operation.

The Kingsbury Machine Tool Co., Keene, N. H., devised the mechanism to control a repeatable-cycle drill for an automatic machine tool. The drill rotates at a selected speed, powered by an electric motor. At any required moment, a latch can be tripped, by solenoid, pneumatically, or manually, to start a drilling cycle. Tripping causes a clutch to engage between the drive and a cam-operated ratchet to move the drill into, and then out of the work-piece.

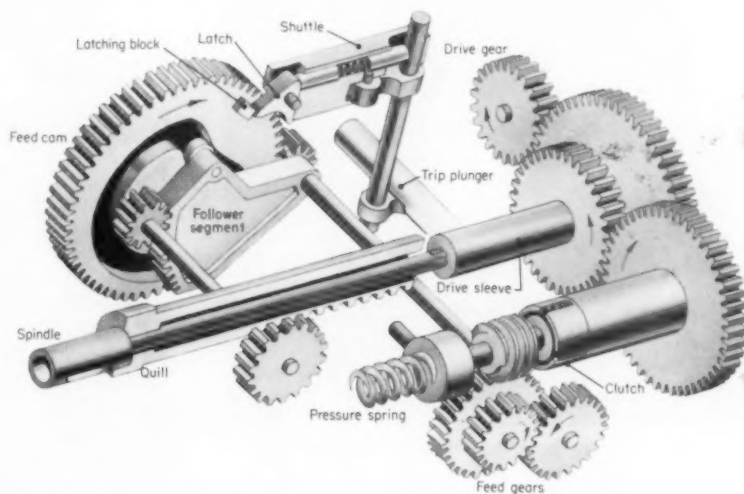
The clutch cannot overheat. The abrupt halting of the feed cam after the latch-block rotates one cycle back to the latch causes the worm gear to climb against the spring (see sketch). This back-up action is sufficient to relieve pressure on the clutch plates.

The clutch system also provides an overload safety release. When an obstacle prevents forward motion of the drill quill, the worm backs up to release the clutch, just as if the latch had been engaged.

Accidental reverse wiring of the drive motor will not cause any internal damage to the unit. The error will become apparent when the latch is tripped, because the drill feed will not halt after one cycle. It will recycle continuously as the latching block slides past the pivoting latch. ♦



DRILLING UNITS from the Kingsbury Machine Tool Co., left to right, are Models 16, 22, and 5. Each unit is self-contained, and may be mounted horizontally (as shown), vertically, or at any angle.



IN THE ILLUSTRATION, the drill spindle is fully withdrawn. After tripping plunger, shuttle moves the latch momentarily to allow feed-cam gear to rotate, as the pressure spring causes the clutch to engage. The drill then goes through one complete cycle, extending and withdrawing, until the latchblock again jams up against the latch.

Gears offset in emergency valve

MOVING THE GEARING aside saves weight and space in a pendulum stop valve.

The valve flange now butts against the pipeline flange, and special spacers no longer hold them a gearwidth apart. Action of the gears opens or closes the disc gate valve with a free-swinging weight at the end of a lever arm. Gears disengage at the bottom of the swing to prevent damage to the valve. They re-mesh correctly when the valve is reset.

Modified designs are available from the maker, Everlasting Valve Co., Union City, N. J. for installations with limited space or vertical pipelines. ♦

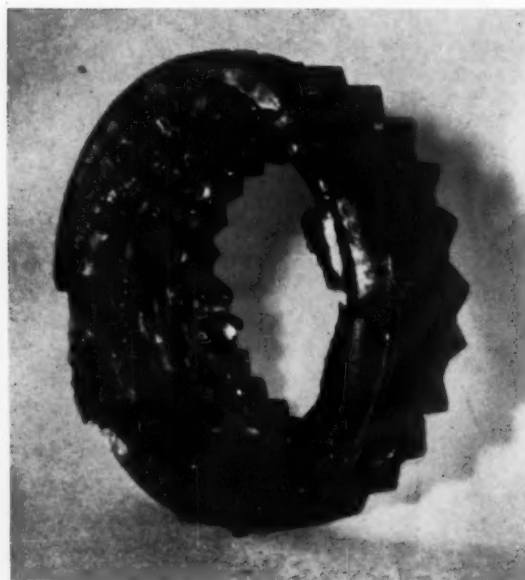
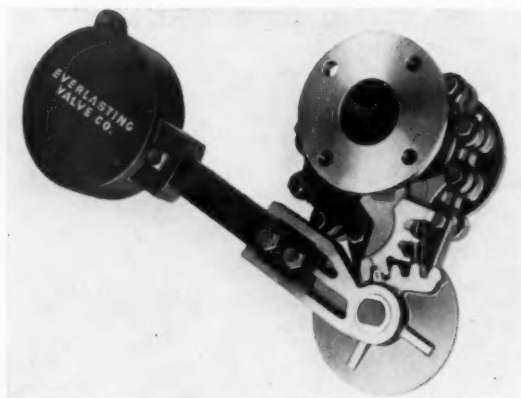


Photo courtesy T. B. Wood's Sons Co.

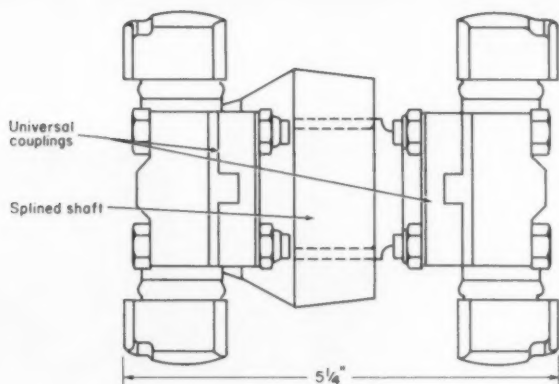
Ruined — one flexible coupling

FLEXIBLE COUPLING between a variable-speed drive and a timing pump recently saved a company \$1,000—and cost them \$8.50.

When a bearing on the pump froze, the rubber coupling was charred, and teeth on the pump side were ground off. But neither the pump nor the variable-speed drive were damaged.

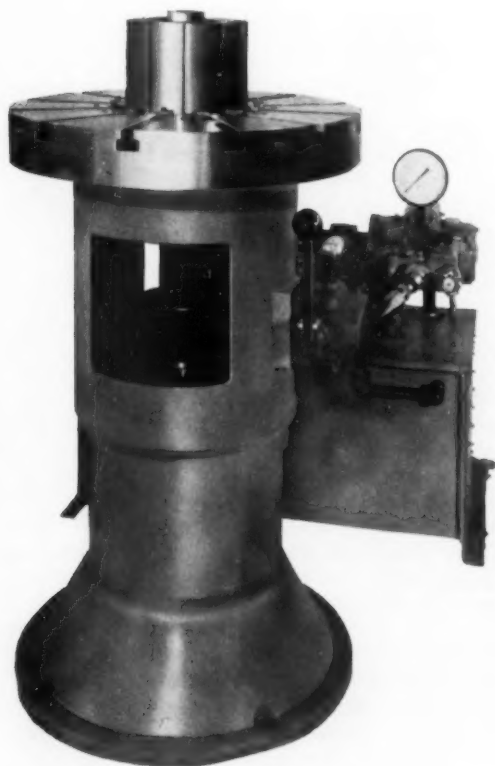
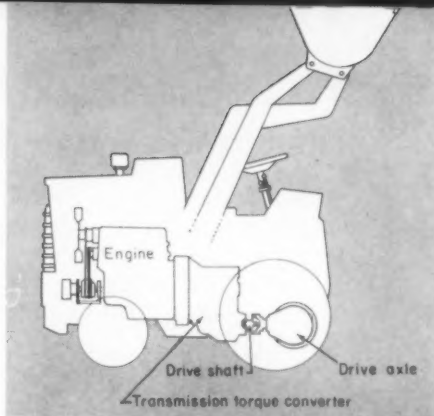
"Last time this happened," commented the plant manager, "we had to replace the pump, and it cost us \$1,000. This time, we spent \$8.50 for a new coupling." ♦

Short shaft has two U-joints



FOR A TRACTOR-SHOVEL to carry over a ton yet turn in a 6-ft aisle, every detail had to be reduced to its most compact form.

As the designers strove to cut the tractor to its minimum length they gave short shrift even to extra length on the drive shaft. The final product has a drive shaft that is a mere 5 1/4-in. long yet includes two universal couplings and two splined ends.—The Frank G. Hough Co., Libertyville, Ill., Payloader H-25. ♦



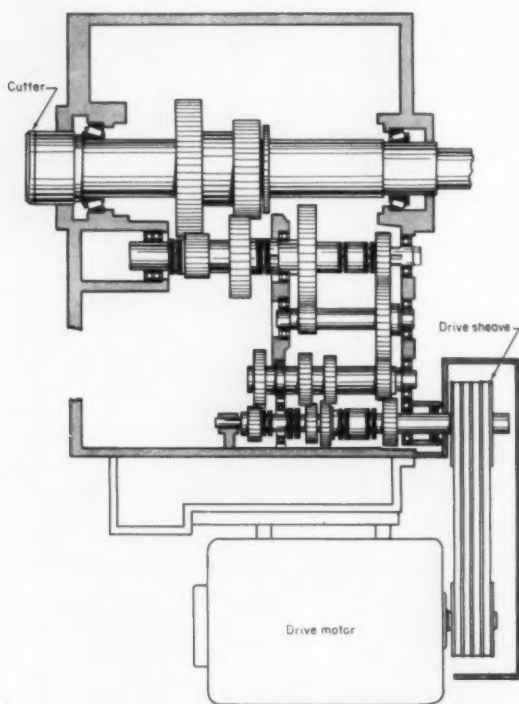
Direct drive powers expanding machine

HYDRAULIC expanding machines are used to size or stretch sheet metal cylinders, cones, or bands to the close limits required for resistance or fusion welding of fabricated parts. One, the Model E-62, has a maximum ram pull of 62 tons.

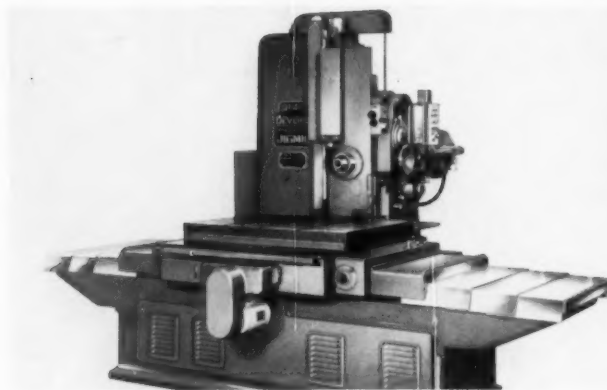
The machine's motor is coupled directly to a hydraulic pump mounted on an oil sump. Hydraulic power, transmitted through a cylinder, actuates 12-segment master jaws to stretch pieces. The machine can make six cycles a minute, with expansion controlled by an adjustment on top of the cone.

The standard machine is hand controlled. An electric pushbutton control, with time lag of ram, are optional. —Manufactured by Greenerd Arbor Press Co. ♦

Spiral Clutch balances gear thrust



EIGHT SPIRAMATIC CLUTCHES of the DeVlieg Jigmil permit a substantially lighter spindle head. More efficient power transmission sends more cutting force from the same size motor, mounted on the movable spindle head, in this machine).



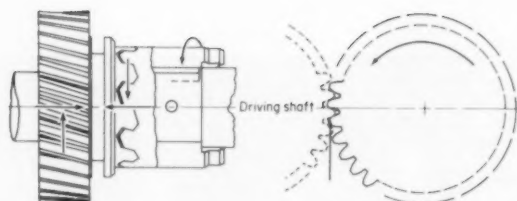
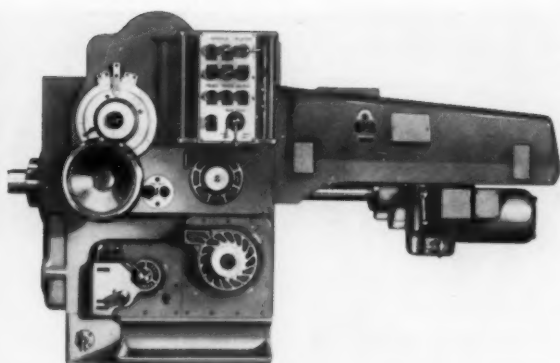
NOVEL ADDITIONS to a sliding spiral gear transmission are spiral-faced jaw clutches that eliminate the side-ways thrust usually associated with spiral gears.

Spiramatic, the patented transmission by the DeVlieg Machine Co., Royal Oak, Mich., is used in a wide variety of machine tools. Advantages claimed for the new transmission are:

- Gears don't disengage; advantages of constant mesh gear trains
- Extremely compact; a high power-to-weight ratio
- Gears simple to make; costs low, even for low production volumes
- No load on gear shifter forks or other shifting mechanisms; makes for ease of control
- Design flexibility; tooling used is standard

In machines where the main drive transmission elements must move (in the case of the *Jigmil* illustrated, up and down the column ways), weight is important. Especially since the movement must be accurate to within 0.0001 in., and must be smooth and powerful to meet modern machining needs, the present general solution to the weight problem has been unsatisfactory. The usual way of driving cutters is with long splined shafts turned by multiple gear boxes housed in the frame of the machine. This scheme lacks precision and smoothness. It is very heavy, and results in a high power loss.

Faces of the Spiramatic clutch are nominally generated to a variable helix angle which is equal to the lead angle of its corresponding gear. Action of the clutch thus has the effect of making the gear and

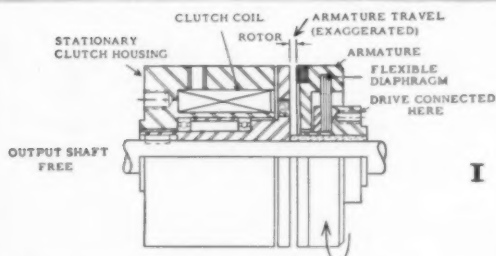


ACTION OF THE CLUTCH is shown with the imposed and resultant forces marked for a driving gear rotating clockwise.

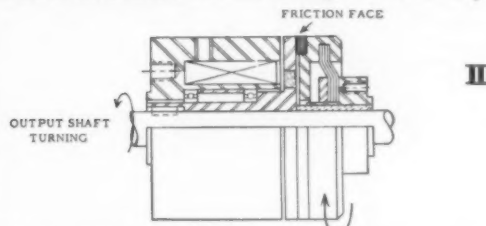
clutch combination a single constant pitch device. Equal and opposite thrust forces are set up by the gear and clutches which consequently have no external component to be absorbed by bearings.

The thrust forces that have proved so troublesome to helical gear transmission designers can now be completely eliminated. Thrust and back-up washers can be taken out, saving weight and space. ♦

Choose A Diaphragm Electric Clutch for Superior Performance Lower Installed Cost



I. DE-ENERGIZED: Armature turning, shaft stationary



II. ENERGIZED: Output shaft being turned by drive through armature to rotor

Like most really sound engineering ideas the practicality and economy of electric clutches and brakes without the conventional sliding armature had to be proved in practice.

Now, a few short years after their introduction, Simplatrol electric clutches and brakes have proved that their design, based on a flexible diaphragm in the clutch's armature, does do a better job than armature plates sliding on splines, pins, or hubs.

Simplatrol's armature, a one-piece assembly, deflects to perform clutching or braking action. Wear is reduced to vanishing point since there are no sliding parts to contact each other; instant performance is achieved without slow release, or "hanging up."

This Simplatrol diaphragm principle ensures smoothness, quietness, and consistency.

Compare the installed cost.

Simplicity carries through to the installation, reducing cost here as well. You simply slip one of the 2 or 3 major assemblies onto the shaft — that's all the assembling you do! No pins, no nuts, no washers, no springs to run up labor cost.

Machined parts in the clutches and brakes are of uniform quality. There's close built-in control of tolerances and finishes . . . and the assemblies are pre-burnished! All clutches include bearings, machined surfaces and bolt holes for direct mounting of your drive unit.

Simplatrol offers a complete range of diaphragm electric clutches from torque of 10 ounce inches to 470 pound feet in diameters from 7/8" to 12 1/2". Styles include clutches, brakes, clutch-brakes, duplex clutches, and couplings in both rotary and fixed field types.

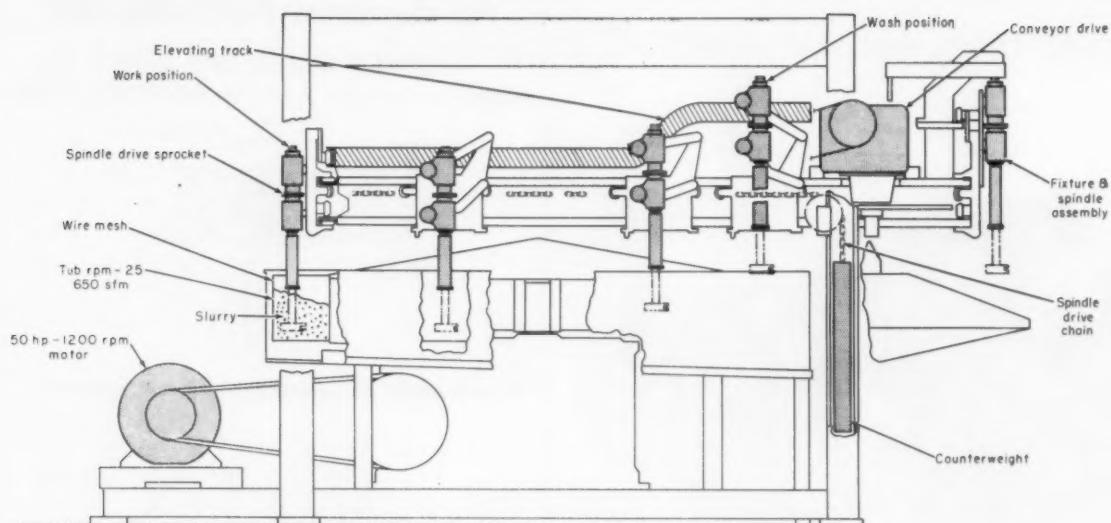
Ask Simplatrol's sales engineers to demonstrate to you specifically how the unique advantages of flexible diaphragm performance will benefit your operation.



Simplatrol products corp.
24 SALISBURY ST., WORCESTER, MASS.
Representation in Key Industrial Areas

Circle No. 30 on Reader Service Card

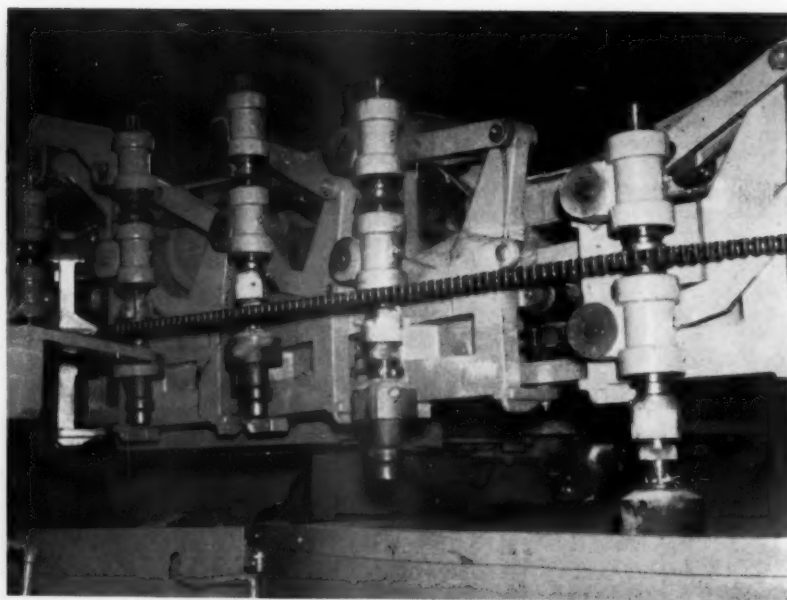
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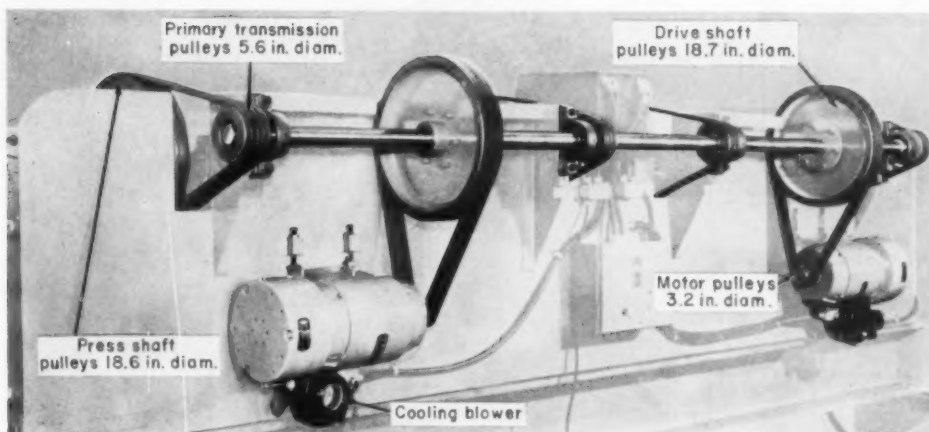
Stationary chain drive imparts a spin

CHAIN DRIVE in which the chain stays put rotates an intricate machine part for deburring. As the part moves forward and down into the slurry, a sprocket on its clamp engages with the chain. Spin is imparted for the time the part is in the slurry.

Because the clamp carrying the part was not motorized, the F. Joseph Lamb Co., Detroit makers of the deburring machine, had difficulty in devising a simple method of spinning the part as it passed through the slurry. The counterweighted chain now rotates the part on each clamp at 13 rpm as it dips towards the tub. ♦



High-torque motors eliminate flywheel system is safer and more simple



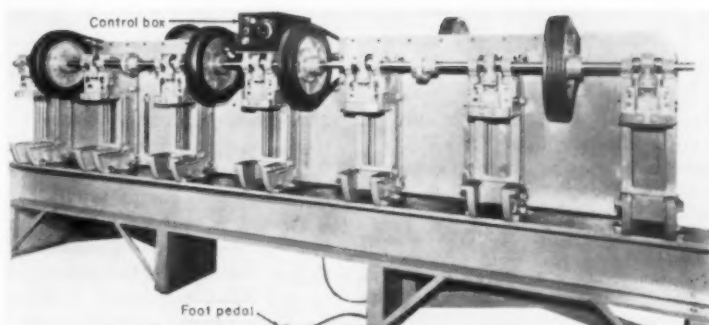
HEAVY DUTY COG BELTS are capable of transmitting eight tons impact from the motors to each press in the gang; accelerate and decelerate rapidly without slippage.

STARTING OR STOPPING within a fraction of a stroke length, gang-driven metal punch presses deliver an eight-ton impact, without the usual flywheels and clutches. Instead, high-torque synchronous motors transmit the immense starting torque required through a rugged non-slip belt drive.

Describing his company's new press, Tom Thornburgh, plant manager of Kenco Manufacturing Co., Los Angeles, claimed it will reach full speed and power in $\frac{1}{4}$ revolution of the driving motors. It can be brought to a halt in less than $\frac{1}{3}$ of a stroke of the press.

Advantages claimed for the unique system are mechanical simplicity, and added safety. When the press is halted, the entire transmission is dead, with no energy stored in rotating parts to cause an accident should a clutch be carelessly engaged.

The seven presses in the gang have a $1\frac{1}{2}$ in. stroke and operate at 90 strokes per minute. Power comes from two 5-hp electric motors, each delivering 100 ft-lb of starting torque. Power is delivered to the primary drive shaft by four



SEVEN GANG-DRIVEN PRESSES recently installed at Lockheed Aircraft Corp. plant in Burbank, Calif., are controlled from the safety panel in the center of the bench.

A-section belts from each motor. Four pulley drives transmit the power from the primary shaft to the press operating shaft. The two outer pulleys are fitted with four B-section belts each, and the two inner pulleys each carry three B-section belts.

When the motor current is switched off, two 50 ft-lb magnetic brakes halt the presses almost instantly. To take care of the large amounts of heat generated by the brake, a cooling fan has been added to the motor housing.

A safety feature incorporated in

the press control requires the operator to press a two-button switch with both hands raised above his head clear of the operating mechanism while it is in motion. Releasing either button breaks the electrical circuit and stops the press instantly.

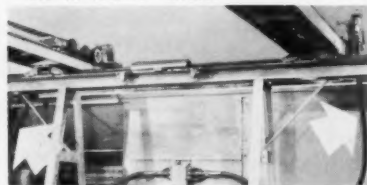
Relay sequencing may be set in four ways at the control panel, for continuous operation, inching, single stroke, or foot control. The fourth position is marked *unsafe*, because it allows the operator to endanger his hands while the press is moving. ♦

Elliott FLEXIBLE SHAFTS

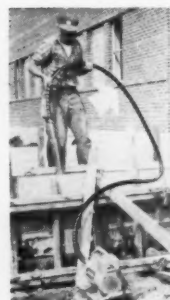
- CUT COSTS
- SAVE TIME
- ELIMINATE MOVING PARTS



Elliott Flexible Shafting drives machine used for slosh-vibration tests of aircraft fuel cells with gross weight of 7 tons. Machine rocks through 30-degree arc on concave track. Flexible shafting drives vibrating table 2800 cycles per minute in full $\frac{1}{8}$ " circle.



Textiles are sized, stretched and dried on above machine. Fabric is transferred to picks on moving overhead tracks and carried out 100' for sizing and drying. Two Elliott Flexible Shafts perfectly synchronize lateral motion and varying speed in pick drive.



Elliott is America's largest manufacturer of flexible shafting for concrete vibrators. Dryer mixes, stronger, more uniform concrete are the results.



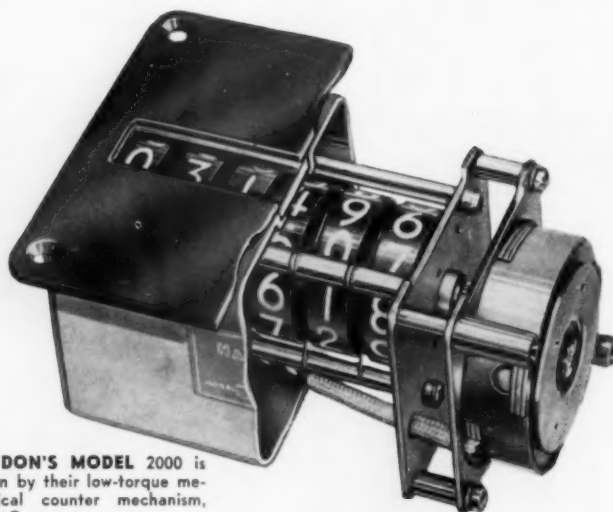
Write for our
Catalog 263

FLEXIBLE SHAFT DATA
FOR DESIGNERS

B.W. ELLIOTT MFG. CO., INC.
251 State St., Binghamton, N. Y.

Circle No. 10 on Reader Service Card

Spring stores counter torque



HAYDON'S MODEL 2000 is driven by their low-torque mechanical counter mechanism, PlanetGear.

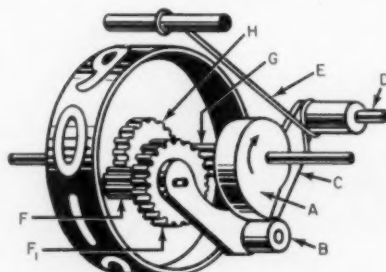
THE SAME INPUT TORQUE that turns one number turns all six dials of a mechanical counter now on the market.

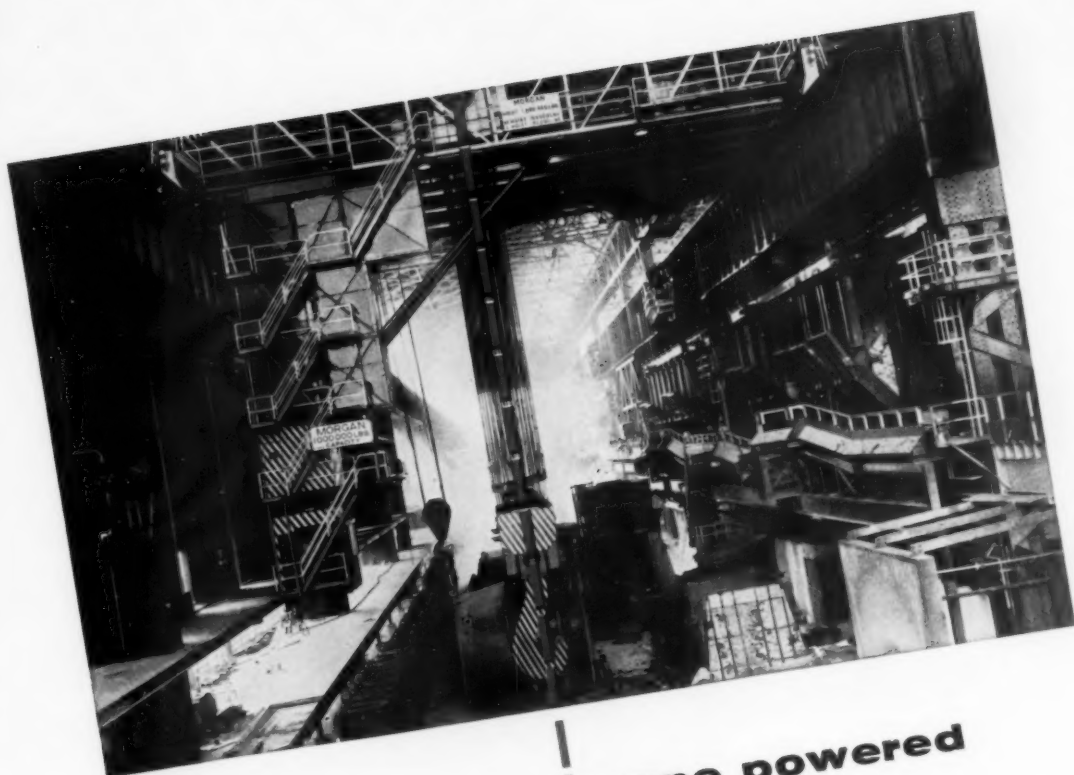
Replacing the standard Geneva movement, a planetary gear system drives the low-torque counter through an unusual arrangement. A spring stores energy supplied to it through a cam-and-follower for 9/10 of the cycle, and releases it to turn the next higher-order dial in the remaining tenth. Haydon Instrument Co., Waterbury, Conn., says their counter operates effi-

ciently at 1,000 rpm, and has run over a hundred million counts without failure.

Bearings, gears, cam and roller-follower are all nylon, and the whole counter is lubricated for life. The stepping motor has no ratchets or contacts to wear out. The complete package, including five of these accurate driving systems, is less than three inches long, weighs only 6 oz. The company uses the same driving mechanism in time clocks and devices needing continuous, accurate readouts. ♦

Cam A is driven smoothly and continuously by the input source. Follower B is held against the cam by the force of spring E. On the same arm, C, pivoting about D, the planetary gear assembly F and F_1 are mounted. As the cam turns, follower B moves outward, and the gear F moves around H without turning it. As the follower reaches the steep slope of the cam, however, the stored energy of spring E moves the arm C rapidly inward; rotates H, and changes the reading of the dial. The cam is actually a part of the lower order adjacent drum, gear H is part of the dial shown, and the gear ratio from G through F_1 F to H is 10:1.





Morgan 500-ton ladle crane powered by Cleveland drives

In an Eastern steel producer's open-hearth department, this giant 500-ton hot metal ladle crane substantially speeds up furnace-to-mold time on their ingot casting flow.

It features two custom-built Cleveland worm and gear sets transmitting 360 horsepower each for driving the hoist gear train on the 500-ton large trolley—providing uniform hoisting speed and power at all times.

Clevelands are designed and built to meet any requirement, wherever a powerful right-angle drive is preferred. Get the latest facts on the "Cleveland Story". Write us for your free copy of Bulletin 145.

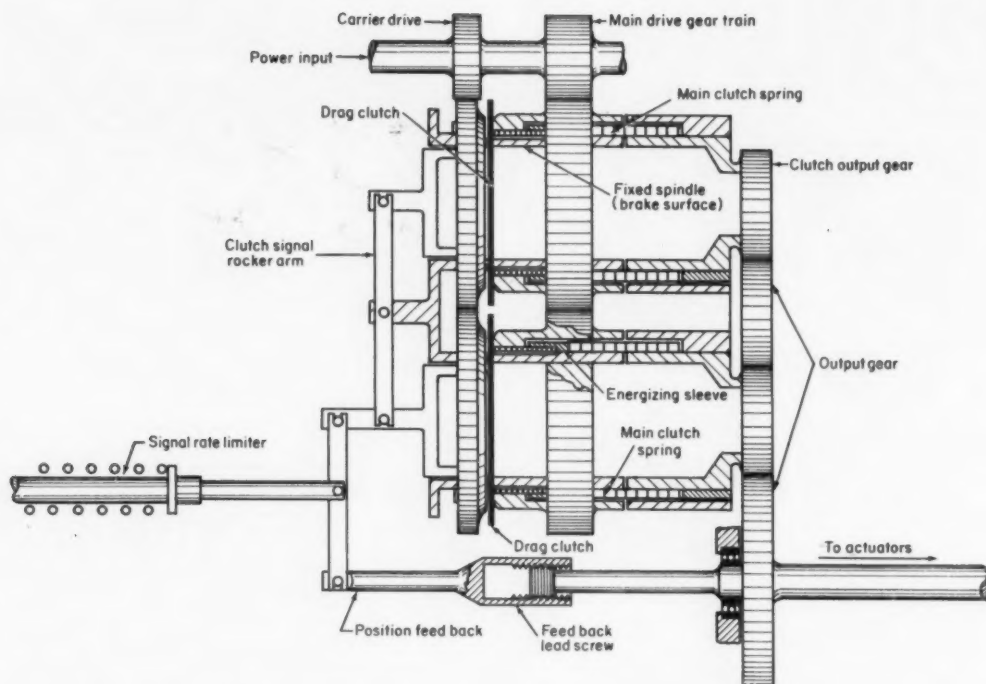


CLEVELAND
Worm Gear
Speed Reducers

Cleveland Worm & Gear Division
Eaton Manufacturing Company
3273 East 80th Street • Cleveland 4, Ohio

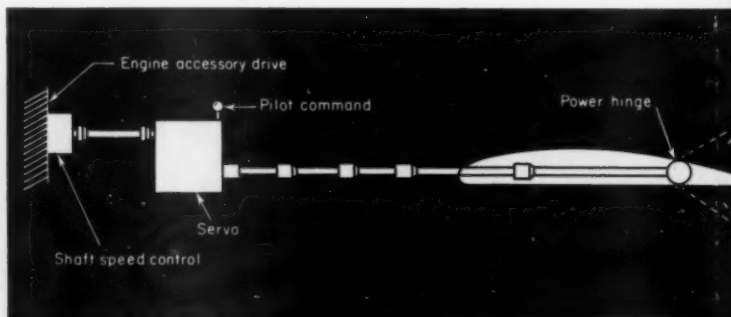


Fast response of mechanical servo is the key to this mechanical power



THE SERVO SYSTEM is a mechanical on-off circuit. Output shaft rotates at full speed as long as there is a difference between command signal and output feedback. The pilot's input signal changes the diameter of one of the two main clutch torque springs. The spring wedges between the input and output drums, and causes motion in the command direction. Motion at

full speed continues until the output drum restores the clutch spring to its original diameter. The output shaft is then released. An override limits the amount of force that can be exerted on the servo input mechanism. It also stores pilot commands that are given slowly, until the command is large enough to merit a control-surface motion.



transmission

MECHANICAL POWER TRANSMISSION for aircraft flight controls may soon compete with hydraulic systems.

North American Aviation Inc., Los Angeles, has installed mechanically powered flight controls on an F-100 supersonic fighter simulator. The system, developed by Curtiss Wright Corp., uses power drawn from a constant-speed accessory drive-shaft of the aircraft's jet engine.

Engineers at the two companies say that in ultimate design, the mechanical system will weigh 500-lb less than the present hydraulic system in the F-100. It will be 1000 times stiffer, offer 1000 times the resistance to flutter of the aerodynamic surfaces it controls.

The new system was discussed at the annual symposium of the SAE's A-6 committee in October. Theme of the meeting was *Has the Fluid Power Industry Lagged in Technological Progress?* E. K. Rose, group leader for primary flight controls at North American, presented the new transmission in a paper that assumed it had. ♦

MECHANICAL POWER TRANSMISSION from primary source to flight control has these advantages:

- Single transmission shaft is used instead of the power and return lines of a hydraulic system.
- Unaffected by temperature change.
- Mechanical servo systems are extremely fast, and independent of the level of resisting load.
- Transmission of power as rotation is more efficient than as hydraulic pressure, with its conversion losses.



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Bunting NYLON
An additional Bunting service

NOW available from Bunting distributors all over America

Bunting nylon puts at the disposal of engineer and manufacturer a tested material for bearings and parts that fully meets all requirements in which the unique qualities of nylon are desired. It is strong, tough, heat resistant, rigid but with high embeddability, and practically self-lubricating. There are many and various applications where Bunting nylon will improve performance.

- Bunting nylon is available from stock in solid rods, extruded tubes, tubular bars, pressure tubing and plate.
- Unusually wide range of sizes and shapes provides low cost fabrication and minimum of machining.
- It is readily machined, blanked, ground, turned and welded or bonded with adhesive. High production speeds can be maintained.

Bunting nylon expands Bunting's comprehensive service—now supplying bearings, parts and bars made of cast bronze, sintered metals, aluminum and nylon. Available from stock or made to blueprint for production and maintenance requirements.

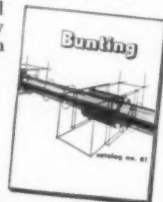
MACHINE SHOP SERVICE

Small lots of bearings, or parts made of Bunting Nylon, Cast Bronze, Sintered Bronze, or Aluminum can be made immediately at low cost by fully equipped emergency machine shops in Bunting branches. The wide range of sizes of Bunting Stock bearings, bars and Nylon shapes makes the alteration of a stock item easy and economical. Your local Bunting Distributor can arrange for such work.

- Write for Nylon Catalog No. 32. Nylon Technical Brochure No. 33.
- See our new complete General Catalog No. 61 in Sweet's Product Design File $\frac{11c}{Bu}$ or write for a copy.

The BUNTING Brass and Bronze Co., TOLEDO 1, OHIO
BEARINGS, BUSHINGS, BARS AND SPECIAL PARTS OF
CAST BRONZE, SINTERED METALS, ALUMINUM AND NYLON

Circle No. 7 on Reader Service Card



BEARINGS

DESIGN AND
APPLICATION

A nomogram to simplify . . .

Calculating bearing loads with worm gears

By **NICHOLAS S. HODSKA,**

Transmission group, Sikorsky Aircraft Div., United Aircraft Corp.

BEARING LOADS ON WORM SET SHAFTS are found by trigonometrically resolving the thrust, tangential, and separating force components acting on each bearing.¹ To find these forces you must know horsepower and speed at the input, pitch diameters of worm and worm gear, and helix and pressure angles. Force components can then be calculated from:

$$T = \frac{63,000 \times \text{hp}}{n} \quad (1)$$

$$P = \frac{2Q}{d} \quad (2)$$

$$F_t = P \cot \gamma \quad (3)$$

$$S = T \tan \alpha \quad (4)$$

Symbols are defined in Nomenclature on page 48.

The nomogram on the facing page solves these equations. As an illustration of the use of the nomogram,

¹Complete procedure for calculating loads on bearings of worm gear sets is covered in "Determining Bearing Loads due to Power Transmission with Right-Angle Gears," page 40, *Power Transmission Design*, August 1960.

P , F_t and S will be found for the gear set shown in Fig. 1.

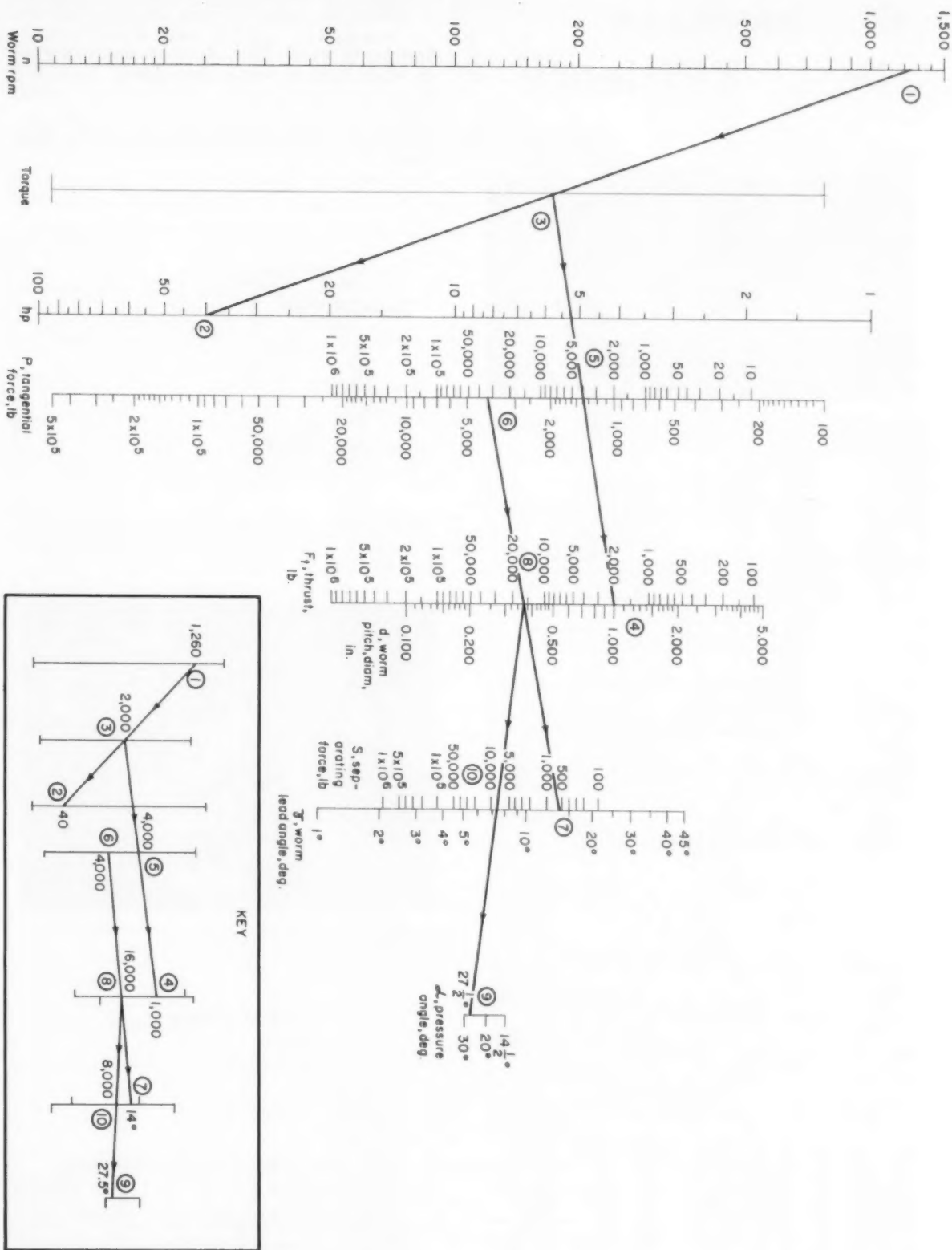
1. Connect 40 hp on hp scale with a straight line to 1260 rpm on n scale to find point 1 on scale T . This point corresponds to T , but the scale is unmarked for simplicity.

2. From Point 1 on scale 1 draw a straight line to the worm pitch diameter (1 in.) on scale, d . This will intersect the P scale to give the value of P which is 4000 lb in this case, from the left-hand side of the P scale.

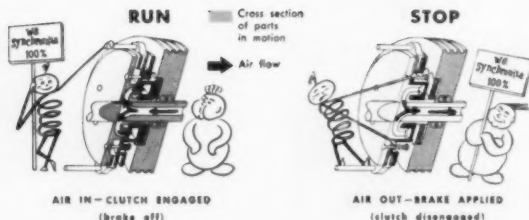
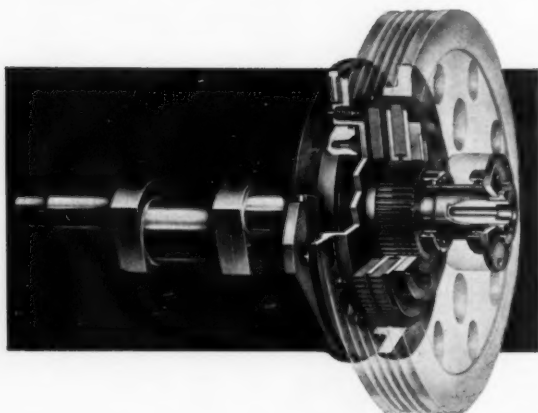
3. On the right-hand side of the P scale, draw a straight line from the P value found to the value of the worm lead angle (14 deg) on the Lead Angle scale. This line intersects the *Worm Thrust* scale at the required value of T , 16,000 lb.

4. Draw the straight line connecting worm thrust and the tooth pressure angle (27½ deg). This line intersects the *Separating Force* scale at the wanted value of S , 8000 lb.

Efficiency: Worm gear load calculations often omit



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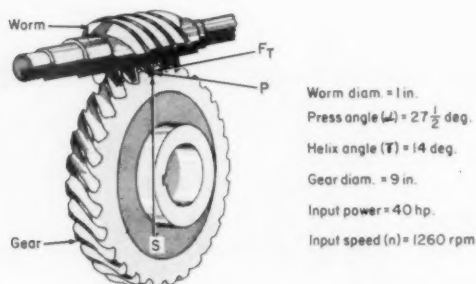
CALCULATING BEARING LOADS

the effect of efficiency since it reduces bearing loading on the shaft supporting the worm wheel. Fig. 2 shows how efficiency varies with helix angle of the worm and coefficient of friction. If it's desired to include this in the calculations, the following equation should be used to determine the value of tangential force on the gear.

$$P_g = -F_t \times E \quad (5)$$

where

$$E = \frac{\tan \gamma (1 - f \tan \gamma)}{f \tan \gamma}$$



Worm diam. = 1 in.
Press angle (α) = $27\frac{1}{2}$ deg.
Helix angle (γ) = 14 deg.
Gear diam. = 9 in.
Input power = 40 hp.
Input speed (n) = 1260 rpm

FIGURE 1. Forces due to power transmission with worm gearing are shown vectorially in this sketch. The accompanying nomogram is used to quickly find values of tangential force, separating force, and thrust.

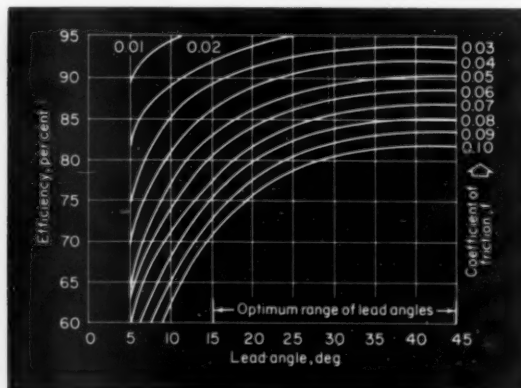


FIGURE 2. Curves showing how efficiency of worm gearing varies with lead angle and coefficient of friction.

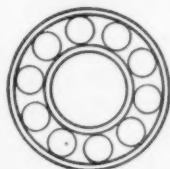
Nomenclature

- D_w = Worm pitch diam, in.
- d_g = Worm gear pitch diam, in.
- E = Efficiency, %
- F_t = Thrust, lb
- f = Coefficient of friction
- hp = Horsepower
- n = Speed, rpm
- P = Tangential force, lb
- S = Separating force, lb
- T = Torque, in.-lb
- α = Tooth pressure angle, deg
- γ = Helix or lead angle of worm, deg

Reduce Bearing Space— Increase Bearing Life on heavily-loaded applications!

ORANGE *STAGGERED* ROLLER BEARINGS

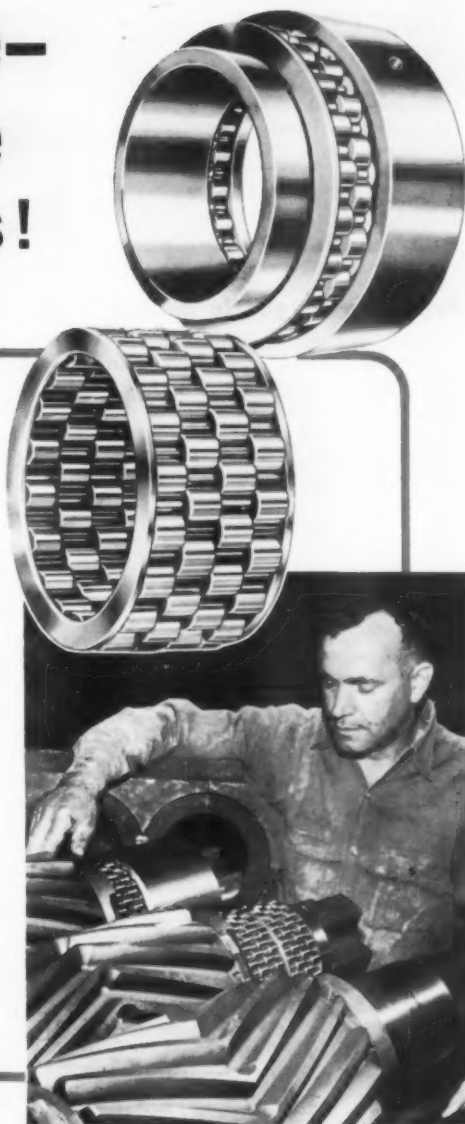
with the unique STAGGERED ROLLER DESIGN



By using many short rollers in staggered arrangement instead of fewer long rollers as in conventional bearings, Orange "Staggered" Roller Bearings provide outstanding advantages for heavy-duty, highly-stressed and precision applications. They do the work of larger straight roller bearings—save space, weight and cost—assure long, trouble-free operation.

End views of "Staggered" roller bearing (top) and conventional bearing, show how many short rollers distribute the load over a multiplicity of contact points within the loaded zone.

- **Reduced Roller Skewing.** Short Orange rollers can skew only a fraction of longer rollers for a given angular misalignment. Short rollers align themselves independently, whereas longer rollers skew along their full length.
- **Better Fatigue Life** because short rollers greatly reduce damaging effects of edge loading, compared with long trunnion or cylindrical rollers, when dimensional deviations of parts or uneven loading are encountered.
- **Run More Smoothly** because closer centers of staggered rollers have half the chordal distance of conventional bearings. Especially valuable in printing, or rolling steel or foil.



"Staggered" Bearing ends trouble in Rod Mills

Converting to Orange "Staggered" Roller Bearings in the pinion stands of its rod mills, Washburn Wire Company, Phillipsdale, R. I. eliminated periodic bearing replacements and high lubrication costs. Operating 24 hours a day under tremendous loads, the "Staggered" bearings have remained maintenance-free for over 3 years. Washburn engineers say the change-over paid for itself in one year.

● Orange "Staggered" Roller Bearings are available in a complete range of sizes interchangeable with other bearings in the 200 and 300 series.

WRITE FOR ENGINEERING MANUAL M-59

ORANGE
ROLLER BEARINGS

ORANGE ROLLER BEARING CO., Inc.
552 Main Street, Orange, N. J.

Needle Bearings — Staggered Roller Bearings
Journal Roller Bearings — Thrust Roller Bearings
Cam Followers



PRODUCT NEWS

Continued from page 23

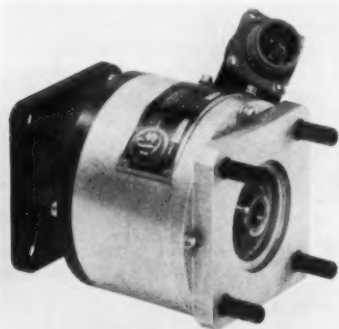
grease cups and zerk fittings with hand oilers, oil can, or by brushing. No curing or special surface treatment needed.

Hohman Plating and Mfg. Co., Dayton, Ohio.

Circle No. 211 on Reader Service Card

Precision magnetic pickup

Designed for sandwich mounting between a tachometer generator and an AND 20005 engine mounting pad, Model 2034 Tachometer Pickup delivers high level signals to operate remote frequency counters or recording instruments. Precision sealed



bearings permit speeds up to 10,000 rpm. Standard operating frequencies are 60 or 120 pulses per rev. Rotor-stator assemblies with frequencies from 1-240 cycles per rev. available on order. An interchangeable rotor and stator can be installed to provide new frequencies with no calibration adjustment needed. A rear mounting flange accommodates standard AN 5544-3 engine tachometer or a suitable ac or dc generator. Mating connectors on all pickups.

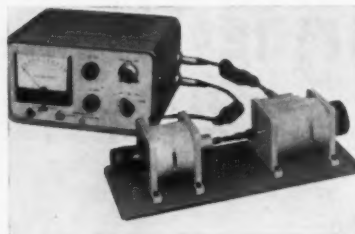
Meriam Instrument Co., ILS Electronic Div., Cleveland, Ohio.

Circle No. 212 on Reader Service Card

Gear analyzer

Alternately applied clockwise and counterclockwise torque shows the shaft backlash angle and detects minute shaft motion while determining breakaway torque. An amber light comes on when the desired backlash torque has been applied and a red light when the allowable breakaway torque has been passed. Both backlash and breakaway torques are adjustable over a wide range of values, and there are mounting adapters for gear heads, servo systems, potentiometers, switches, valves etc. Lever locks restrain shaft rotation for positive zero

position return. Measurement of shaft rotation is within one minute of arc accuracy. A double collet sliding coupling transmits the backlash and



breakaway torques which may be preset within the instrument ranges, from .002 to 48 oz in.

Rotiform Co., Santa Monica, Calif.

Circle No. 213 on Reader Service Card

Tiny accelerometer

At present in the prototype stage, this accelerometer weighs less than 3 oz and is slightly under 1 cu in. in volume. It's said to be the first of its size to provide non-pendulous motion, frictionless suspension and positive displacement damping over a wide temperature range. Operates at peak efficiency within a range of -65 to plus 250 F, withstands shock up to 100 G's and vibration up to 2000 cps at 30 G's. It has a 4-25v. output depending on the excitation frequency. Design innovations include variable area fluid coupling to control the natural frequency, sculptured diaphragm suspension and a linear differential transformer.

Minneapolis-Honeywell Regulator Co., Boston, Mass.

Circle No. 214 on Reader Service Card

Starters and contactors

Type CY Size 00 starter and Type CY Size 00 contactor are for non-reversing full voltage starting of 1/6 to 2 hp squirrel cage motors. Can be



used on either single or three phase motors operating on 110 to 600 v power, and 25 to 60 cycle frequencies. Starters have melting-alloy, thermal overload relays (only one needed on

single phase). Available as open, or in NEMA Type 1 general purpose enclosures in Form MA (separate push button), Form MB (selector switch) and Form MC (start-stop push button).

The Clark Controller Co., Cleveland, Ohio.

Circle No. 215 on Reader Service Card

V-belts

Banrope fractional hp belts are made to American specifications by the Bando Rubber Mfg. Co. of Japan. Unusually large tension cords are claimed to give a high degree of tensile strength. Fractional hp belt sections are identical to industrial belt sections of comparable size. Prices F.O.B. distributor's Cleveland warehouse.

Banrope, Inc., Cleveland, Ohio.

Circle No. 216 on Reader Service Card

Hand tachometer

Priced from \$95, the Series 27 Triple-tach comes in three types: Type A measures from 200 to 10,000 rpm; Type B from 100 to 5000 rpm; and Type C from 20 to 1000 rpm. Three



scales, changed by a thumb switch, permit fine readings within these measuring ranges. Accuracy is $\pm 1\%$ of full scale deflection. Accessories include carrying case, extended range adapter and a special disc for directly measuring surface speeds.

Metron Instrument Co., Denver, Colo.

Circle No. 217 on Reader Service Card

Piston motors and pumps

Fixed displacement piston type axial motors and pumps in the C3F series have displacements of .72, 1.09, 1.45 and 1.81 cu in. per rev. Rated for continuous duty of 3000 psi and intermittent pressures to 3500 psi, they can produce 3.3 to 8.5 gpm at 1200 rpm, and 5 to 14 gpm at 1800 rpm. Operating speeds up to 2400 rpm.

Used as motors, these 4 sizes have torque ranges of 11.52, 17.28, 23.04

and 28.80 in. lb per 100 psi, or output hp (1200 rpm) from 5.5 to 18 and (at 1800 rpm) from 8 to 22, at 3000 psi. Largest size, working at

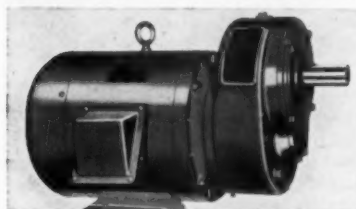


2400 rpm, delivers 28 hp at 3000 psi. Mounting bosses can handle 1 in. NPT inlet or 1½ in. OD tubing thread.

Webster Electric Co., Racine, Wis.

Circle No. 218 on Reader Service Card

Gearmotors and reducers



Gearmotors range from 1 to 150 hp, ac, single, double and triple reduction,

with speeds as low as 7.5 rpm. They are available in AGMA Classes I, II, and III; in open, enclosed and explosion-proof enclosures; with a variety of mountings for either parallel shaft or right-angle drive (up to 30 hp).

Line-O-Drive reducers are offered from 1 to 75 hp, ac, with output speeds down to 1.2 rpm, for either flange or foot mounting. Open, closed or explosion-proof motors, with standard NEMA starting torques.

Howell Electric Motors Co., Detroit, Mich.

Circle No. 219 on Reader Service Card

LPG engine lubricant

Available in weights from SAE 10 to SAE 50, this lubricant was developed for liquid petroleum gas and natural gas engines. It blends selected paraffin base stocks with a detergent agent to prevent carbon build-up. High heat resistance, low sulphur content.

Lubricant Engineers, Inc., Fort Worth, Texas.

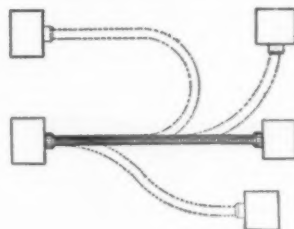
Circle No. 220 on Reader Service Card

Test Stand

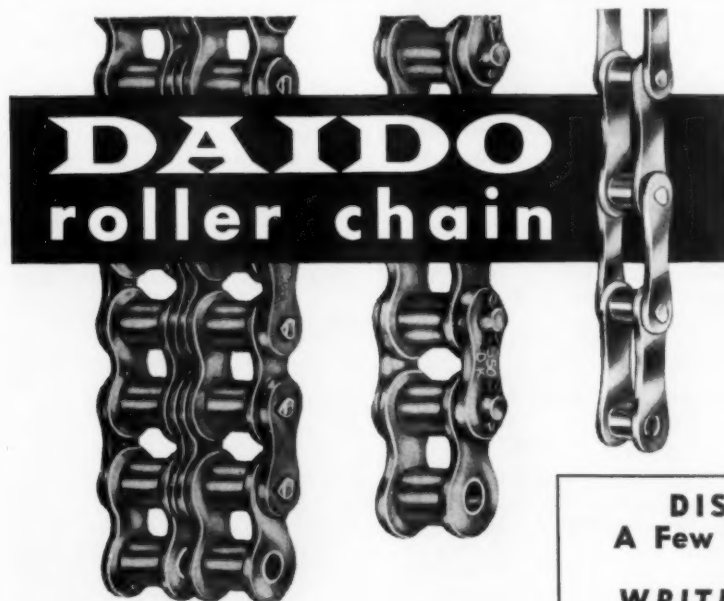
This stand has four horizontal and two vertical cast iron tables, normalized, ground to 90° ± 10' and drilled

Circle No. 49 on Reader Service Card

FLEXIBLE SHAFTING OFFERS NEW FREEDOM OF DESIGN



Before the innovation of Flexible Shafting, it was necessary to transmit power from a drive unit to its driven unit by means of a solid shaft which utilized expensive and cumbersome gearing. Today the Flexible Shaft alone provides a means of transferring this power from one unit to another by going around, over, and under obstacles. This allows you more space in your design, and eliminates the age old problem of having to have perfect alignment of the shaft and its drive or driven unit in order to make a connection. Flexible Shafts are simply curved towards the unit and connected by means of a ferrule, or an end fitting. If you have any application, now or in the future, which will require control from remote places, you owe it to yourself to write F. W. Stewart Corporation, 4311 Ravenswood Ave., Chicago 13, Illinois, for complete information on Circle Ess Flexible Shafting.



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Circle No. 51 on Reader Service Card

PRODUCT NEWS

and tapped (10/32 in.). Motors, gear trains ball bearings and clutches are easily positioned for test on adjustable tables. Torque, power, and ef-



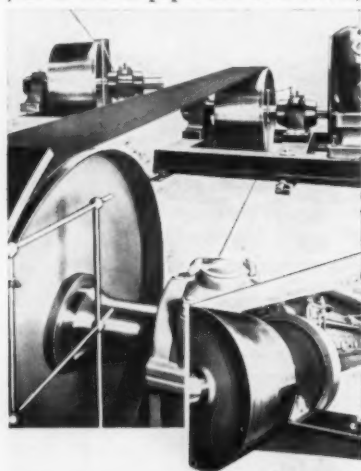
iciency tests are made by vertical mounting of test components. Avoids side loading of bearings, shafts and couplings and maintains precise shaft alignment. Priced at \$195.

Power Instruments, Inc., Skokie, Ill.

Circle No. 221 on Reader Service Card

Nylon and leather belting

Page-Lon belting uses extruded and pre-stretched nylon bonded to leather. The combination has characteristics of elasticity and tensile strength that make it suitable for certain conveyor jobs as well as paper mill cone drives,



short center drives with high pulley ratios, serpentine, crossed and quarter turn drives. Light weight (can be operated to 10,000 fpm and over), and comes in the narrower widths. Can be bonded endless with a hot press.

Page Belting Co., Concord, N. H.

Circle No. 222 on Reader Service Card

Moisture repellent

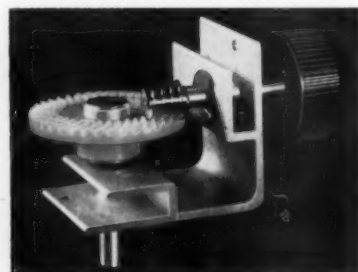
It removes rust and contamination and forms a continuous protective film over most types of surface. Called Calafornex Formula 78-A, it comes in 16 oz aerosol cans for spraying, 1 and 5 gal. drums for brushing, dipping or power spraying. It's non-inflammable and you can use the equipment immediately after applying. Effective for electrical components, all metal surfaces, painted surfaces, rubber, plastic, ceramics.

The Falcon Corp., Brooklyn, N.Y.

Circle No. 223 on Reader Service Card

Anti-backlash gear tuner

Completely backlash-free tuning is possible with this gear tuner assembly. Designed for magnitron tuners, "Klystron" tuning, variable condensers, potentiometers, coils and other devices requiring fine adjustment, units may also serve as hand-operated inputs to any mechanical equipment. Light spring-loading takes minute tooth-to-tooth deviations. The assembly is available with a gear assembly capacity of 20 in. lb., hand-



operated. Normal ratio is 19½:1, but special units with other ratios are available upon request. All materials used in the new assembly are non-corrosive. A molded nylon gear and cadmium-plated brass pinion provide smooth, free running. Bracket is of anodized aluminum.

Spiroid Division, Illinois Tool Works, Chicago, Illinois.

Circle No. 224 on Reader Service Card

Vane pump series

For continuous operation up to 2500 psi, and speeds to 2500 rpm, the TIC series are available in four models rated at 8, 11, 14, and 17 gpm, rotating at 1200 rpm and at zero psi. Consists of 4 major components: a housing with a ballbearing, shaft seal and inlet connection; a pumping cartridge of rotor, vanes, cam ring and floating front port plate; shaft; and end-cap with a roller bearing assembly and outlet connection. Shaft is supported by this bearing and the housing bearing. Standard 2-bolt

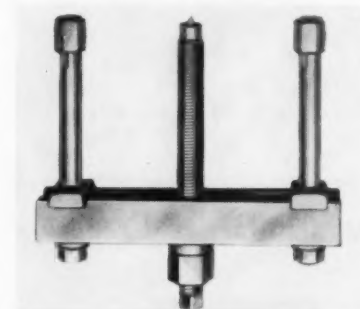
"C" type SAE mounting flange. End cap rotates to 4 positions and port pads match 4-bolt SAE port pads. SAE splined shafts also available.

Denison Engineering Div., American Brake Shoe Co., Columbus, Ohio.

Circle No. 225 on Reader Service Card

Gear-puller legs

A set of 4½ in. long legs which allow easy application of manually operated OTC push-puller No. 927 in confined



areas. New leg set No. 927-D weighs 1 lb. Leg ends are threaded for adapting various attachments to specific jobs.

Owatonna Tool Company, Owatonna, Minnesota.

Circle No. 226 on Reader Service Card

Component hangers

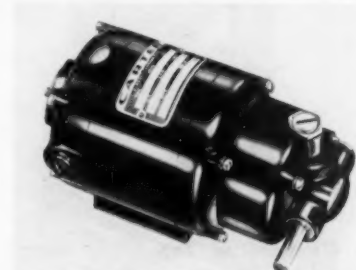
Precision hangers in two heights and a wide range of bore sizes fit standard rotating components. Also available in blank state for non-standard sizes. Made from aluminum alloy castings, machined for squareness, and with a black anodized finish. Mounting centers are spaced for use with most existing bread board plates.

Sterling Precision Corp., Port Washington, N. Y.

Circle No. 227 on Reader Service Card

Improved gearmotors

Gears in 1961 fhp Classic gearmotors are a new type phenolic material, and



have improved wearing qualities, quieter operation and cooler running. Twenty standard single and double reduction models available, with shaft

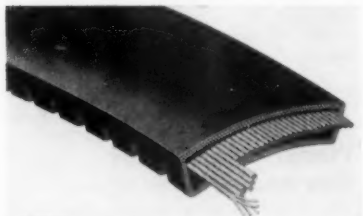
outputs ranging from 10 to 750 rpm. The shaft position is easily changed to six 30 degree positions by means of 6 screws. Motor shaft runs on ball bearings, gear shafts on bronze sleeve bearings. Overall size is 6 x 3-5/16 x 3-3/8 in. high. Weight approximately 5 pounds. Available with universal shunt or series motors. Inputs from 12 to 220 volts on most models. Shunt models up to 115 volts dc.

Carter Motor Co., Chicago, Illinois.

Circle No. 228 on Reader Service Card

Variable speed belts

New line top widths of standard sizes from 3/8 to 3 in., nominal overall lengths from 26.4 in. to 170 in. Material used is fiber-reinforced syn-

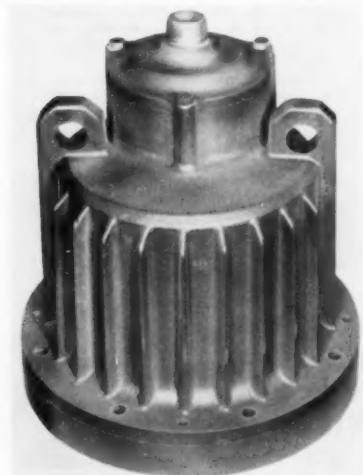


thetic rubber, impervious to oil and heat, and staying live under static conditions. Stretch-resistant reinforcing cords keep the length constant under severe use, or in storage.

Lovejoy Flexible Coupling Co., Chicago, Ill.

Circle No. 229 on Reader Service Card

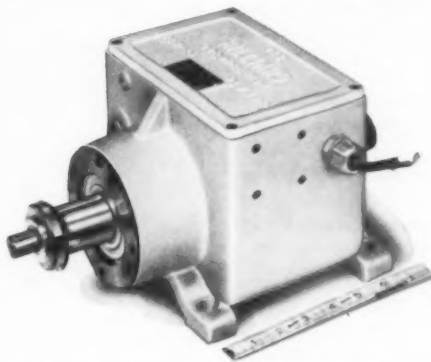
Submersible ac motors



Pressure-proof motors for close coupling to centrifugal pumps working in any depth of water, oil or liquid chemicals, are available from 1/2 through 40 hp for polyphase power, and 1/2 through 5 hp for single phase. Design feature is a neoprene diaphragm with a built in O-ring which

February, 1961

HILLIARD'S *New* "I.D.U."



A complete, packaged unit that gives you precise control of intermittent motion from a constant rotary power source!

Built-In features:

- Contains all the parts in one package.
- Can be installed as easily as a motor and needs only electrical connection.
- Self-lubricating for long life of 40,000,000 or more cycles.
- Operating speed from 40 to 400 R.P.M.
- Torque capacity 36 ft. lbs.
- No cumulative error in cycling.
- Instant engagement.
- Mount with direct coupling connection or use with belt, chain or gear drive.

Can be installed on existing equipment, designed into new machinery and re-used after production line changes.

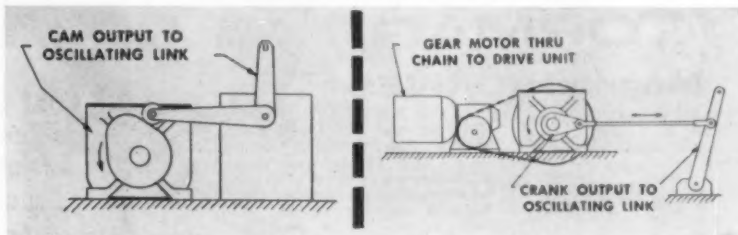
A single package unit that gives you precise control of intermittent motions . . . oscillate or repeat . . . clip and bend . . . shear or slash . . . raise or lower . . . index and position . . . from a constantly rotating source of power.

HILLIARD "I.D.U." eliminates the need of buying separate parts and assembling a "custom" machine with assorted mechanisms to control it.

"I.D.U." features highly flexible control—manual, mechanical or electrical—permitting "demand" type operations in fixed or variable cycles. A protected drive, totally enclosed in an oil bath housing, it is ideal for dusty, "steamed" or "washdown" conditions.

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Optional accessories extra

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Circle No. 47 on Reader Service Card

PRODUCT NEWS

encircles the motor base and flexes to neutralize differences of internal and external pressure, relieving pressure build-up around the O-ring and the positive shaft seal. Heavy, one-piece ribbed housing, oil filled. Rated at 55 C temperature rise for 30-minute duty in 40 C air, and for continuous duty in 40 C liquids.

Reliance Electric and Engineering Co., Cleveland, Ohio.

Circle No. 230 on Reader Service Card

Steel housed synchro

Designed to lessen the error curve produced by temperature variations in aluminum-housed synchro motors, this unit has a stainless steel housing which meets the weight requirements of aluminum housed types. At 125 C, the steel housed synchro has deviated only 1 to 2 minutes from its room temperature curve while aluminum housed model showed a deviation of 15 minutes. Also reduces problems of expansion and contraction found with aluminum.

Daystrom, Inc., Transcoil Div., Worcester, Pa.

Circle No. 231 on Reader Service Card

Universal motors

Three models complete a line of 17 motors in the 1 to 1/50 hp range. Ratings are: 1/2 hp at 5000 rpm, 1/4 hp at 7500 rpm, and 1 hp at



10,000 rpm. All three are frame size 4334, with pad bases, weight of 13 lb, length of 8 3/8 in., width of 5 1/2 in., and height of about 5 1/2 in. Built in aluminum housings, they operate on 115v dc to 60 cycles ac, and are non-reversible.

Universal Motor Div., Robbins & Myers, Inc., Springfield, Ohio.

Circle No. 232 on Reader Service Card

Small tachometer generator

New model SU 780D-1 retains the 1 1/2 diameter frame, with an overall

body length of 3 1/2 in. but increases the armature length for higher output. Stainless steel 3/16 in shaft, convenient mounting flange. Outer shaft bearing has a neoprene seal and the outer terminals are protected against shorts by a cover. For 45-volt/1000 rpm applications. Cost \$57.50 each.

Servo-Tek Products Co., Hawthorne, N. J.

Circle No. 233 on Reader Service Card

Steel flexible shaft

The 5/16 in. diameter core of this shaft is made up of layers of stainless steel wire, with outer interlocked end fittings also of 316 and 321 stainless. End fittings are square and allow for slight changes in length from varying torques. Ferrules are made to attach the casing to meet the particular needs of the job. Available in any length.

Stow Mfg. Co., Binghamton, N. Y.

Circle No. 234 on Reader Service Card

Vibration-resistant thermostat

The HT-500 is a snap-acting, high-temperature safety switch which is resistant to vibration, easily installed (switch built into head bolt). Designed to shut off the magnetos of air-cooled engines at head tempera-

PREVENT MOTOR BURNOUT

Install Positive "MOTOR PROTECTION" with GLEASON-TORMAG[®] Magnetic DRIVES

TORMAG Drive protects Canning Equipment against Jamming.



Motor overload, high inertia starts, varying loads, jamming, stalling — just can't damage your motor, machines, products, or production schedule when you add GLEASON-TORMAG Magnetic Drives. TORMAG Drives cushion your load, provide dependable controlled torque, high slip or continuous stall operation that no other device can equal — and without maintenance! Write on your company letterhead for suggestions, and your copy of catalog TP2-60.

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Representatives in Principal Cities
in U.S. and Canada

Circle No. 31 on Reader Service Card

Typical "ground all over" series 1600 "precision" bearing.

Typical "unground" series 3000 "precision type" bearing.

COST REDUCTION is Today's No. 1 Design Problem ...and NICE Can Help Lower Costs!

WRITE FOR CATALOG NO. 190

NICE BALL BEARING CO.
NICE TOWN • PHILADELPHIA • PENNSYLVANIA

YES, the bearings illustrated are identical, except for degree of precision. Because of the precision differences, there is a substantial difference in cost . . . NICE can provide bearings incorporating any degree of precision between the higher priced "ground all over" series 1600 and the low cost "unground" series 3000.

ARE YOU PAYING FOR MORE PRECISION THAN YOUR BEARING APPLICATION REQUIRES? The specific requirements of your particular application should determine the precision features of the bearing you use.

Circle No. 43 on Reader Service Card

POWER TRANSMISSION DESIGN

ture of 400 to 520 F, it features completely sealed construction with fused glass insulation. Specifications: single-pole, single-throw, normally open or closed, complete range -65 to -520



F. Contact spacing and size adequate to short magneto or energize relays.

Thermo-O-Stats, Inc., Chartley, Mass.

Circle No. 235 on Reader Service Card

Miniature flexible couplings

Expanded line includes 12 new models, including a new $\frac{1}{8}$ in. OD coupling

Fasteners and Lacing for Both Conveyor and Transmission Belts

We make a correct type of fastener or lacing for every flat belt—for every belting material, size, load, travelling speed and working condition. We manufacture them all.

PLATEGRIP

Fasteners for conveyor belts of any width, from $\frac{1}{4}$ to $1\frac{1}{2}$ " thick.



HINGED PLATEGRIP

for separable conveyor belts of any width, from $\frac{3}{8}$ to $\frac{1}{2}$ " thick.



STEELGRIP

Flexible Belt Lacing. 12 sizes for light conveyor and power transmission belts.



Safety

Belt Hooks—patented binder bars hold alignment and protect belt ends. 6 sizes.



WIREGRIP

Belt Hooks—Patented alignment feature holds hooks in perfect alignment—6 sizes.



Write for Catalog

ARMSTRONG-BRAY & CO.
5328 Northwest Highway • Chicago, Ill.

Circle No. 38 on Reader Service Card
February, 1961

in both pancake and split hub types. Sizes now range from $\frac{5}{8}$ to $1\frac{5}{16}$ OD, and bore sizes from .0937 to .6875 in. Ratings cover 15 to 40 in.-lb of torque at high speeds, with torsional rigidity and no backlash. Couplings absorb angular misalignment up to .015 in. and axial movement up to .060 in. Shoulders for mounting gears or cams can be provided or other modifications in mountings or materials.

Dial Products Co., Bayonne, N. J.

Circle No. 236 on Reader Service Card

Flexible coupling material

Called Elastine, it's claimed to have double the life and to be tougher than rubber. Developed for flexible coupling inserts, but has many other possible uses.

Shurclose Seal Co., Detroit, Mich.

Circle No. 237 on Reader Service Card

Electric adjustable drive

Called Statotrol drives, these fractional hp devices use a control module which combines a silicon-controlled rectifier and encapsulated circuitry. This control module, with a suitable potentiometer and disconnecter starts, stops, and adjusts the speed of a dc

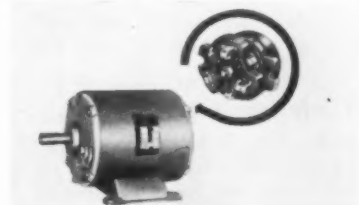
motor. Standard ratings from $\frac{1}{20}$ to $\frac{1}{4}$ hp, speed range of 8:1 continuous or wider range intermittent. Operates on 115-volts 50/60 cycles, single phase, or any standard voltage with a suitable transformer.

General Electric Co., Schenectady, N. Y.

Circle No. 238 on Reader Service Card

Self-protected motors

A line of 67 types of open motors is said to have complete self-protection against overloads, stalling, single phasing, and high ambient tempera-



tures. Motors are 3-phase, ac, $\frac{1}{4}$ through 3 hp and come in a variety of voltages, speeds, and mountings. Protector is wired inside the motor, eliminating contactors and relays.

Kingston-Conley Div., Howell Electric Motor Co., Plainfield, N. J.

Circle No. 239 on Reader Service Card

Quality Clutches Exclusively



These **Over-Center Clutches** are General Purpose, heavy duty, friction clutches for machines requiring high quality dependable clutches with low power losses, low upkeep, and long life. Built in *Flex-Disc*, *Solid Disc* (two halves), and *Gear Tooth* types.

Five sets of over-center toggles provide two to three times greater bearing surface. Easily adjusted for wear by releasing latch and turning toggle assembly.

We offer a complete *Clutch Engineering and Manufacturing Service* — designing, producing, and applying clutches to meet any conditions arising in industry.

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515 Frederick St. • Phone Liberty 7-3359 • Waukesha, Wis.

Circle No. 16 on Reader Service Card

LITERATURE

on drives and components

To get free copies of the following literature, use the Reader Service Cards bound into this issue.

Timing-belt catalog

Timing-belt drives are available for load capacities from fractional hp up to 600 hp, and for belt speeds up to 16,000 fpm. This catalog features a series of copyrighted charts which enable you to select the proper timing-belt drive with minimum arithmetic. One full-page chart to select the proper pitch— $\frac{1}{8}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$ or $1\frac{1}{4}$ in.—from design hp and speed of the pulley of largest rpm. Drive-width selection charts for each of the five pitches. Drive tables to determine driven pulley and belt pitch length when speed ratio and drive pulley are known. Catalog No. 19103. *T. B. Wood's Sons Co., Chambersburg, Pa.*

Circle No. 300 on Reader Service Card

Shaft and flange-mounted drives

Bulletin 7100, 36-pages, presents shaft-mounted drives and a new series of flange-mounted drives covering a torque range up to 44,000 lb in. Reviews design and construction advantages, gives selection and dimensional data, engineering drawings, accessories and typical application photos. Also explains and illustrates new Equi-Poised motor mounts for use with these drives, to accommodate rerated NEMA foot-mounted motors of $\frac{1}{2}$ to 30 hp. *The Falk Corp., Milwaukee, Wis.*

Circle No. 301 on Reader Service Card

Inner ring bearings

Wide inner ring ball bearings are designed to be easily mounted on straight shafts and positioned without locknuts, shoulders or adapters. Sixty-page catalog contains complete specification charts, diagrams and photo-

graphs. Also details a complete line of power transmission units, such as pillow blocks, flange cartridges, cylindrical cartridges and take-up units, all incorporating a wide inner ring ball bearing with self-locking collar. *The Fafnir Bearing Co., New Britain, Conn.*

Circle No. 302 on Reader Service Card

Abrasive hard gear finishers

Six-page Bulletin #999-60 describes and illustrates the improved Model 999 abrasive hard gear finishers, used for final surface conditioning of gear teeth after hardening. Gives complete specifications, tells how finisher produces crown and tapers, discusses cutting fluids, new resins for hones, automatic and manual hone dressing and automatic loading and unloading. *Michigan Tool Co., Detroit, Mich.*

Circle No. 303 on Reader Service Card

Teflon stock list

Covers hollow cylinders, tubing and rod for machining. Prices every practical size and gives helpful instructions for machining gaskets, bearings, lantern rings, piston rings, seats, and seal rings. Catalog C-2. *Halogen Insulator and Seal Corp., Franklin Park, Ill.*

Circle No. 304 on Reader Service Card

Automotive and industrial U-joints

Catalog J-1960 has 218 pages of specifications and descriptive information on many types and sizes of automotive and industrial universal joints; cross-sectioned dimensioned drawings with specification tables, and a decimal equivalent table. Covers a wide

range of general engineering data on U-joints as well as servicing instructions and ordering information. *Mechanics Universal Joint Div., Borg-Warner Corp., Rockford, Ill.*

Circle No. 305 on Reader Service Card

Revised stock bulletin

Standard, off-the-shelf items in revised Bulletin G-51a include extruded solid rounds, centrifugally cast bars, extruded rectangles, rolled sheet and plate, die blanks and guide pin bushings, produced from aluminum bronze alloys. Deals with physical properties, recommends applications and lists current stock sizes. *Ampco Metal, Inc., Milwaukee, Wis.*

Circle No. 306 on Reader Service Card

Centrifugal clutches

Rawson automatic centrifugal clutches and clutch couplings for a wide range of industrial applications are reviewed in newly revised and enlarged Catalog No. 142. Presents factors covering clutch selection, typical application examples and dimensions (keyed to cross-sectioned drawings) on six standard types of clutches available for direct or indirect drives, free or delayed engagement. Charts and graphs cover hp ratings, service factors, allowable acceleration, and mounting arrangements. *Formsprag Co., Warren (Detroit), Mich.*

Circle No. 307 on Reader Service Card

Splash-protected motors

Weather and splash-protected motors cost only 5% more than standard open types, provide greater reliability and reduce repair expenses. Available 1-150 hp ac with a variety of mountings. Described in Bulletin 1010 (A, B). *Howell Electric Motors Co., Howell, Mich.*

Circle No. 308 on Reader Service Card

Adjustable speed drives

Bulletin GEA-7208 describes new half-wave fractional hp, electronic adjustable speed drives, using silicon-controlled rectifiers instead of tubes to supply power to the motor. Offers application data and dimensions and explains design features such as a new control module with encapsulated circuitry which provides protection against shock and vibration. *General Electric Co., Schenectady, N. Y.*

Circle No. 309 on Reader Service Card

Product data sheets

Product Data 2001 covers a complete line of solid shaft differentials, in standard sizes, for shaft diameters from .0780 to .2499 in., with a guaranteed backlash rating of 5 minutes max. Product Data 3001 describes a new line of hollow-shaft differentials, featuring an integral V-block clamp design for positive locking and minimum space envelope, for shaft diameters from .0550 to .1875 in. *Empire Flight Components, Inc., Bellmore, N. Y.*

Circle No. 310 on Reader Service Card

Rod ends

Catalog 101 gives details of large size rod ends, control rod assemblies and high angle rod ends with studs. Load ratings, dimensioned drawings and construction details of the patented spherical bearing used in these assemblies. *Split Ballbearing, Div. of MPB, Inc., Lebanon, N. H.*

Circle No. 311 on Reader Service Card

Industrial rubber products

Revised 24-page Catalog M5 deals with the company's complete line of rubber products including the pat-

ented Poly-V drive, V-belts, transmission belt, conveyor belt, and all types of hose, flexible rubber pipe and expansion joints, plus a summary of molded and extruded products. *Manhattan Rubber Div., Raybestos-Manhattan, Inc., Passaic, N. J.*

Circle No. 312 on Reader Service Card

Gear-making facilities

Lists the manufacturing and inspection facilities, with particular emphasis on the inspection department. Many photographs and a detailed review of the great array of equipment available for cutting and testing almost all types of gears, worms, splines, helicals, face gears, precision types, prototypes, etc. *Schafer Gear Works, Inc., South Bend, Ind.*

Circle No. 313 on Reader Service Card

Electric power shift

Two-page flyer includes engineering data and complete specifications of a transmission with an electric shift, torque rating of 262 lb ft, max. reduction of 9.55:1, in 2, 3, or 4 speed changes. Called Model 14800-EC, it has electro magnetic clutches for speed changes and reversing under

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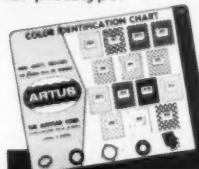


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February, 1961

HORTON



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have built-in rotary Air joint! Mount anywhere!

A combination clutch and sheave, the "Air-Champ" automatically tunes trouble out of starting problems. Gives shockless starts! Installs easily... anti-friction bearings... "V" belt or pilot adapter type drive... control with static air pressure, 2 models; up to 800 inch lbs. of torque. Write us for brochure. *Patent Pending

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57

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Every issue of **POWER TRANSMISSION DESIGN** offers a gold mine of design product, application and industry information. Product facts, catalogs, data books, manuals; the latest facts for your engineering and purchasing files are yours for the asking. The easy way to ask is to use one of the Reader Service Cards bound into this issue.

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LITERATURE

power without stopping motor. Can be adapted to remote control by tape, cam etc. *Western Mfg. Co., Detroit, Mich.*

Circle No. 314 on Reader Service Card

Limit switch

Bulletin GEA-7305, 4-pages, describes new magnet-operated limit switch (Form CR115) for accurate position detection—without contact—of objects moving in erratic paths. Text explains why no levers, rods, etc. are necessary. Drawings show how to operate and mount. Lists prices. Rated 0.75 amp make at 115 vac max; 0.2 amp carry and break at 115 ac max. *General Electric Co., Schenectady, N. Y.*

Circle No. 315 on Reader Service Card

Motor selection guide

Twelve-page guide for motor users who specify for installation on original equipment, or in commercial buildings and industrial installations. Motors from $\frac{1}{2}$ to 10,000 hp, including ac induction types (low or high slip) and a section on constant speed, unity power factor synchronous

motors, in horizontal or vertical construction. *Fairbanks, Morse & Co., Electrical Div., Freeport, Ill.*

Circle No. 316 on Reader Service Card

Fluid power applications

Fluid Power News #15 gives four fluid power "case histories" of applications to direct chill billet casting production in aluminum plants, roll life on hold-down and lift systems on paper machines, speed synchronization on a new paper machine, and the steering gears of a cross section of vessel types. *The Oilgear Co., Milwaukee, Wis.*

Circle No. 317 on Reader Service Card

Complete motor line

Bulletin 2651 features 23 types of motors with photos and brief descriptions of applications, available ratings, enclosures, and modifications. Line includes standard squirrel cage types, rated from $\frac{1}{4}$ to 2500 hp in various enclosures and mounting modifications. Also gearmotors to 150 hp, dc motors to 400 hp, wound rotors to 800 hp, synchronous induction to 150 hp, plus alternators, generators and many types of specialized motors. *The Louis Allis Co., Milwaukee, Wis.*

Circle No. 318 on Reader Service Card

Servo motor catalog

Short-form catalog, 20-pages, has complete specification data on a line of 60 cycle and 400 cycle servo units. Inertial-damped servo motors and servo motor tachometers included in catalog. Servos available for transistorized circuitry as well as high temperature operation. Units from size 5 up. *IMC Magnetics Corp., Eastern Div., Westbury, N. Y.*

Circle No. 319 on Reader Service Card

Automatic clutch

Clutch can be converted to a constant speed drive by re-arranging the sheaves. Called the Power-Flo, it offers 80 to 95% efficiencies as clutch or as constant speed regulator on 1-25 hp engines. Product Catalog PFT-60. *Morse Chain Co., Ithaca, N. Y.*

Circle No. 320 on Reader Service Card

Motor bulletin

Bulletin 05-51B9040B highlights Super-Seal motors with emphasis on advantages of Poxeal and Silico-Flex insulations to increase the reliability of open motors. Illustrates numbers of tests of insulation stability in water, mud etc. *Allis-Chalmers, Milwaukee, Wis.*

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TRIANGLE
BEARINGS
with
Engineered
INDIVIDUALITY



Triangle fits the bearing to the application. Whether you can use a standard, like the Pillow Block above, or need a special such as the Pedestal or Clamshell Bearings shown below, your particular bearing problem receives the individual attention best assuring cost reductions—quality improvements.

SELF-ALIGNING . . . SELF-LUBRICATING SLEEVE-TYPE PILLOW BLOCKS



The widest selection of mountings available—functionally designed, efficiently produced. Experienced sales engineers available to help you anywhere. Phone or write for descriptive literature.



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734 Division St. Oshkosh, Wisconsin

Circle No. 32 on Reader Service Card

February, 1961

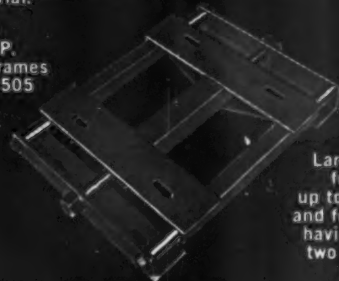
WHAT'S YOUR PROBLEM ? *Is it any of the following?*

- Diminishing output due to a progressive drop in rpm.
- Too much down-time because of the need for frequent adjustment due to belt stretch.
- Excessive maintenance time and expense.
- Poor belt and bearing life.
- A drive in an inaccessible or isolated location.
- A high-ratio short-center drive.

MOUNTING THE MOTOR ON AN "AUTOMATIC" BASE MAY PROVE TO BE A SIMPLE AND ECONOMICAL SOLUTION

Motor mounting position and direction of pulley rotation are immaterial.

Stock Sizes
 $\frac{1}{4}$ to 125 HP.
for NEMA frames
56 through 505
and 445-U



Larger Sizes
for motors
up to 500 HP.
and for motors
having one or
two outboard
bearings.

AUTOMATIC MOTOR BASE CO.
WINDSOR, N. J.

Circle No. 5 on Reader Service Card

MEN

of the power transmission field

Fafnir's Leister retires

Fayette Leister, engineering vice president of The Fafnir Bearing Co. retired December 30 after 40 years with the company.

Leister joined Fafnir in 1920 and served successively as sales engineer, assistant works manager, head of the Detroit sales office, and engineering manager. He was elected vice president of engineering in 1946 and a director of the company in 1954.

Widely known in the bearing field, he holds a number of patents and is the only active member of the original Annular Bearing Engineers Committee. This group, formed in 1930, was influential in setting up uniform standards for the bearing industry. He is also a longtime member of the SAE, the American Ordnance Association, and the ASME.

Tann Bearing appoints two executives

Tann Bearing Co., Div. of the Tann Corp., named Kurt H. Hampel general manager and Wallace W. Straton chief product engineer.



STRATON



HAMPEL

Before joining Tann, Hampel was manager of the pulley div. of Active Tool Co., Detroit. He is a graduate of the University of Dresden and has

practiced as a licensed engineer in Germany.

Straton, also a licensed professional engineer, was formerly engineering supervisor for Active Tool and has also had wide experience in engineering job shops.

President David Tann said the appointments would enable the firm to expand its emphasis on design and manufacture of speciality bearings.

General Electric makes Dunn vice president

Oscar L. Dunn, general manager of G. E.'s Motor and Generator Div., becomes a company vice president.

Dunn began with General Electric after graduating from Indiana University in 1936 with a degree in business administration, and has held a number of posts in various departments including the Medical Products Co. and the Apparatus Group. He is a governor of the National Electrical Manufacturers Association.

Lanphier elected president of Fairbanks, Morse

Thomas G. Lanphier, Jr., a 45-year old industrial executive with extensive experience in the administration of research and development projects for both government and business, becomes the new president of Fairbanks, Morse & Co. This is the largest manufacturing component of Fairbanks Whitney Corp.

Lanphier became associated with Fairbanks Whitney in 1960 as vice president planning, after almost 10 years as vice president at the Convair Div. of General Dynamics Corp. There he was responsible for product planning for supersonic bombers and the

Atlas missile. He resigned in March 1960, cutting his connections with defense contracting in order to speak out as a private citizen against what he considered the inadequacy of the national administration's defense program.

During World War II, he flew more than 100 missions as a fighter pilot against the Japanese and the Germans, and one of his combat victories was responsible for the death of Admiral Yamamoto, who planned the strike against Pearl Harbor. Among other official appointments, he has served as special assistant to W. Stuart Symington in 1950 when he was chairman of the National Security Resources Board and represented Symington on the National Security Council Senior Staff.

As president of Fairbanks, Morse he will continue to serve as vice president of the parent company.



LANPHIER



BUELL

Buell joins Formsprag

J. Lawrence Buell III, a Princeton graduate in science and engineering, joins the application engineering staff of Formsprag Co.

Fresh from 40 months military service with the Navy's Civil Engineer Corps, he'll take an 18-week training program at Formsprag's general headquarters and plant, covering design, engineering, research, production, testing, marketing and other phases of the company's operations. He'll then be assigned headquarters engineering responsibilities for the company's new product, called Rev-Lok.

Manhattan vice president retires

Harold H. Burrows, senior vice president Rubber Sales, has retired after 45 years with the Manhattan Rubber Div. of Raybestos-Manhattan, Inc.

He joined Manhattan as a billing clerk in 1915 for \$6 a week, later became manager of the Roll and Tank Depts., then sales manager of Industrial Rubber Products Div. and finally vice president of the Corporation in January 1955.

Burrows is particularly well known in the paper and pulp industry. He was honored on December 14 with a company dinner attended by nearly 200 executives, associates and friends, including the president of Raybestos J. F. D. Rohbach.

Ball new eastern sales manager for Hewitt-Robins

Arley J. Ball, appointed eastern regional sales manager of Hewitt-Robins, Inc., succeeds Norman M. Godfrey recently named manager of operations of the company's Robins Conveyors Div. Ball was formerly sales manager of the Cleveland district. He'll make his headquarters in New York City.

Cooper elected at Diamond Chain

Jack E. Cooper, elected vice president of Diamond Chain Co., Inc., Indianapolis, will be in charge of all company sales operations.

Cooper joined Diamond, a subsidiary of American Steel Foundries, in 1951, and has been manager of sales since 1959.

Menduni is Wood's Houston sales rep.

Joseph Menduni will cover the Houston territory as sales representative for T. B. Wood's Sons Co. His travels will include eastern Texas and southern Louisiana, extending as far west as Austin and east to New Orleans.

Menduni who took mechanical engineering at Ohio State, was formerly with the general products div. of Allis-Chalmers Mfg.

Garlock appoints marketing research manager

Edward J. Verity is the new manager of Garlock's marketing research department. A graduate of Tufts College, he was previously employed by Clayton Skiffs Inc., subsidiary of Lukens Steel Co., as vice president and manager of the company's Toms River, N. J., plant.

Emmons elected to Hewitt Robins board

Eugene F. Emmons, formerly president of Union Chain and Mfg. Co., was elected to the board of directors

of Hewitt-Robins, Inc. He became president of the Union Chain Div. of Hewitt-Robins when H-R acquired Union Chain.

Kubinciak purchasing agent for Dynamic Gear


Adam Kubinciak is the new purchasing agent for Dynamic Gear Co. as announced by William A. Wiegand, president. He was formerly administrative assistant to Wiegand.

PIC names new directors

PIC Design Corp. announces the appointment of three new directors to fill existing vacancies on the company's board.

Named as directors were Julian Lazrus, president of Benrus Watch Co., Inc.; Jay Kay Lazrus, vice president, Benrus Watch Co.; and Lucius P. Wasserman, a partner in the law firm of Wasserman and Shagan and a director of Harris-Intertype, Inc.

Newly elected as corporate officers at the same meeting were Julian Lazrus, treasurer; Jay Kay Lazrus, secretary; and William J. Frazer, Jr., assistant secretary.



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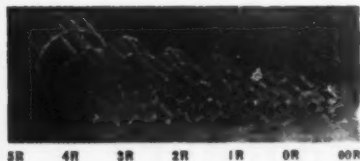
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The most revolutionary
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Development in a century!

- Now available for subfractional, fractional and integral H. P.
- Ability of rubber Flex-Elements to float between captive and fittings distributing load similar to universal joint action.
- Load Ranges—1/12 H.P. through 30 H.P.
- Shaft Sizes—1/8 through 1 7/8.
- Specified exact length to design requirements per series.
- Prevention of end thrust among many other design advancements.*

Dyna-Line The finest flexible coupling in single unit construction—specifically designed for fractional H.P.



- True Flexibility and Torsional Resilience for quiet, load-plus power transmission without extreme deflection or twist.



- Lengths varied to design specifications in each series.

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- Shaft sizes—3/16" to 3/4"
- Lowest O.D. for highest torque capacity.

Write for Catalogs and Technical Bulletins.

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1215 E. SECOND ST. MICHIGAN CITY, IND.

Circle No. 12 on Reader Service Card

REPRINTS

The following reprints of feature articles from **POWER TRANSMISSION DESIGN** Magazine are available:

ELECTRIC MOTORS

Covers ac and dc types. Tables show who makes what. From Nov., Dec., 1960 and Jan. 1961 issues. Thirty-two pages.

1-9 copies \$1 each
10-49 copies 75c each
Over 50 copies, 50c each

CLUTCHES AND BRAKES

An introduction to both friction and positive contact types. From June and July 1960 issues. Sixteen pages.

1-9 copies, 75c each
10-49 copies, 50c each
Over 50 copies, 30c each

GEARMOTORS

Put the power where the work is—with a gearmotor. From Jan. 1960 issue. Twelve pages.

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ELECTRICAL SPEED ADJUSTMENT

Tells how to adjust your speed, any speed, precisely, electrically. Sixteen pages.

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Six nomograms for complete mounting of pivoted motor, base and accessories.

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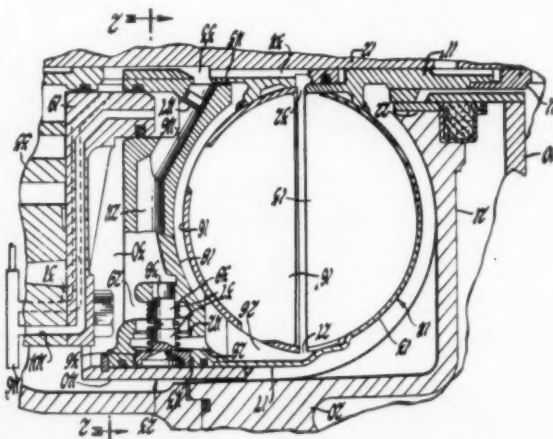
Send all orders—enclosing the exact amount in coins or checks—to: **POWER TRANSMISSION DESIGN**, 812 Huron Road, Cleveland 15, Ohio.

PATENTS

Controlled fluid coupling

U. S. Patent No. 2,916,881; Forrest R. Cheek, Detroit, Mich., assignor to General Motors Corp., Detroit, Mich.

Degree of filling of this coupling is controlled by a

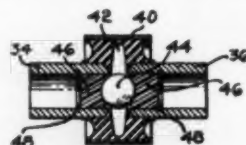


valve which meters the discharge. Valve spool position and flow rate are controlled by pressure applied to one end of the spool, a biasing spring, and centrifugal force acting on the valve spool. Pressure applied to the spool tends to close the valve. The spring and centrifugal force tend to open the valve. Thus, for a given pressure applied to the spool, valve opening increases as speed increases and the amount of fill decreases.

Universal Joint

U.S. Patent No. 2,896,431; George B. Stillwagon, Jr., Dayton, Ohio, assignor of one-half to Kenneth G. Fraser, Dayton, Ohio.

Two tubular, axially-aligned coupling members are joined by a vulcanizable resilient element. A ball sepa-



rates the two tubular members. Packings and snap rings in the tubular members position the ball.

Needed Now

Associate Engineer:

To analyze transient conditions in nuclear reactor systems; develop equations that describe the nuclear and thermal conditions within system components and the application of analog and digital computers to the solution of these equations. Should have a B.S. and M.S. degree in engineering, physics or mathematics, and related experience.

If you qualify for the above position, write immediately to: Mr. C. S. Southard, Westinghouse Atomic Power Division, P.O. Box 355, Dept. X-48 Pittsburgh 30, Pa.

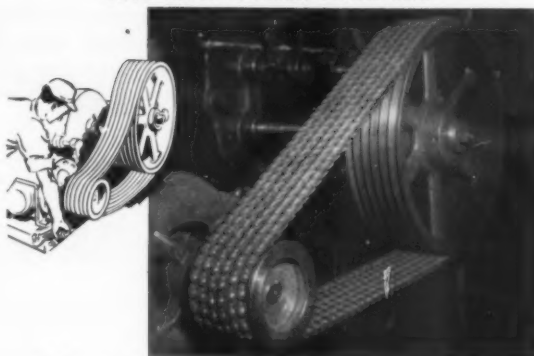
Westinghouse
ATOMIC POWER DIVISION
FIRST IN ATOMIC POWER

Circle No. 25 on Reader Service Card

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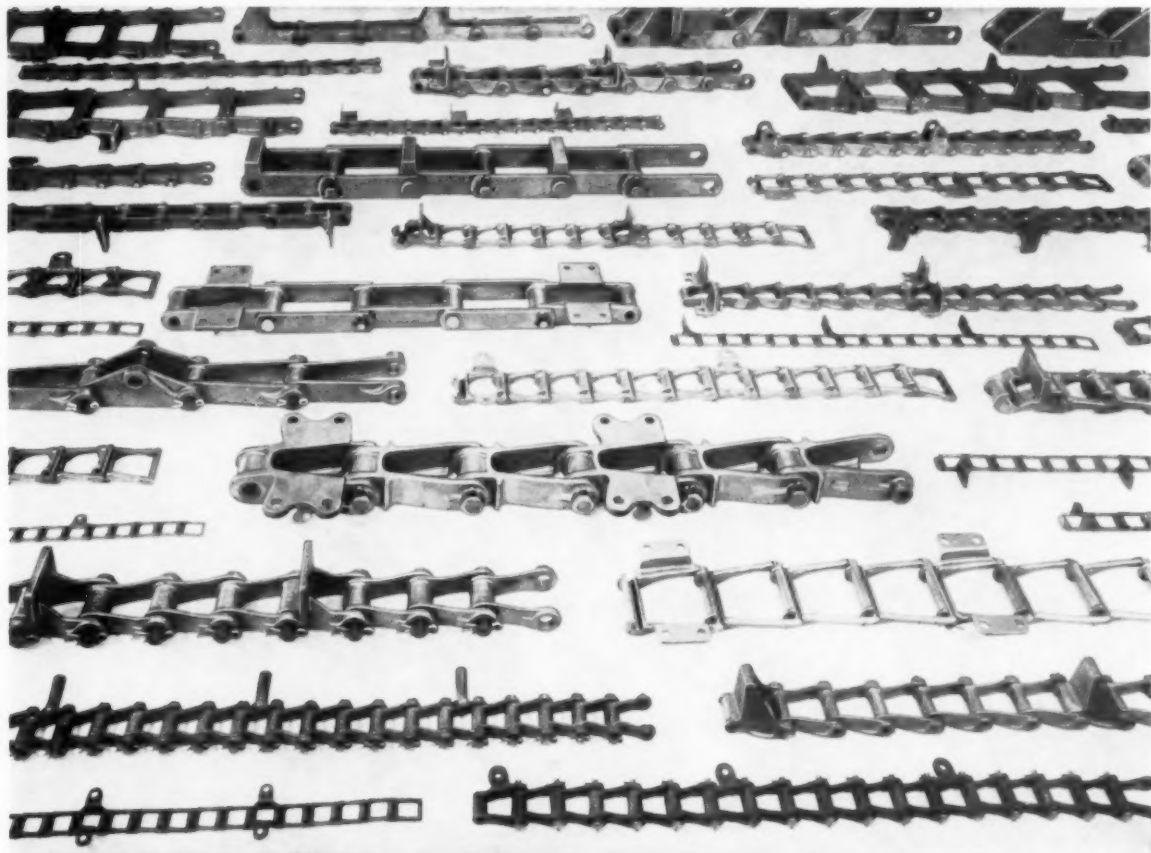
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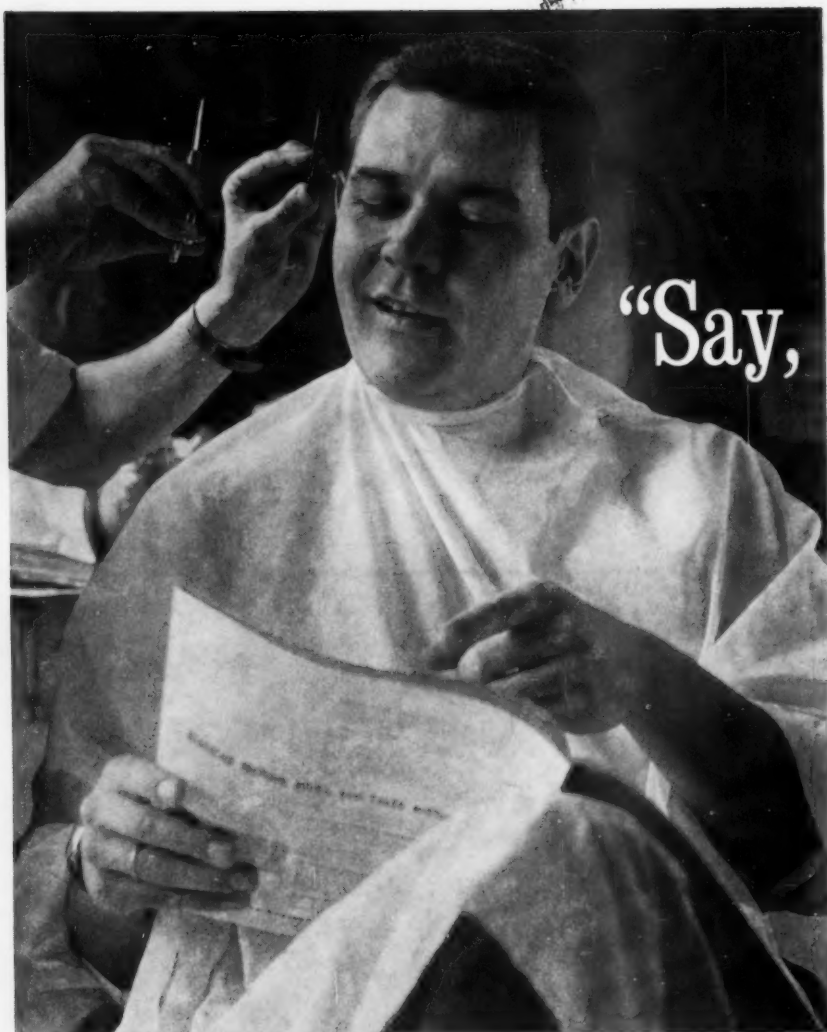
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